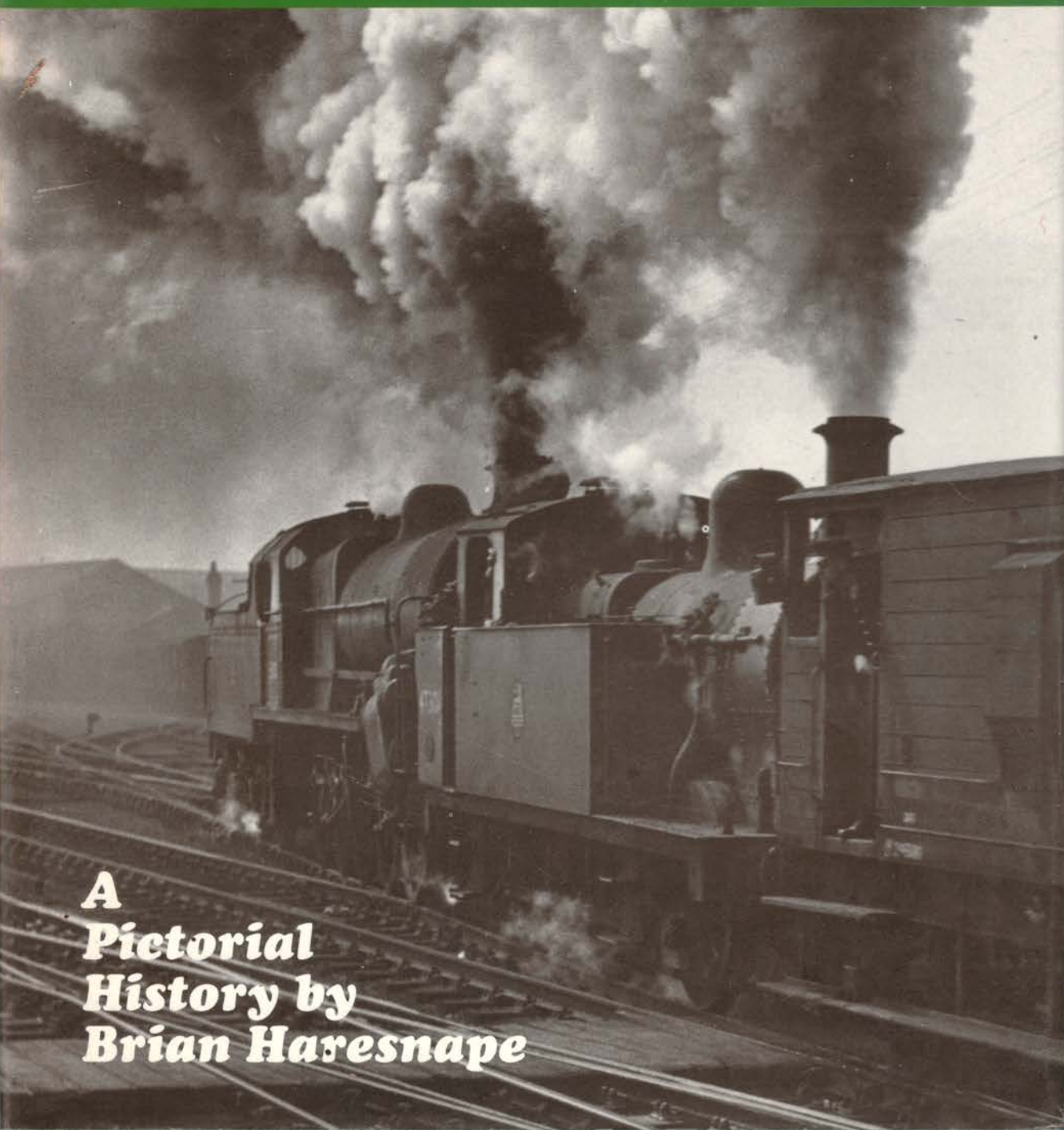
# Fowler Locomotives



A Pictorial History by Brian Haresnape

# *Fowler Locomotives*

*Frontispiece:* Former Somerset & Dorset Joint Railway 2-8-0 No. 53807 heads an Ian Allan 'Severn and Wessex' special out of Bath in 1960. These handsome mineral engines were the largest locomotives designed by the Midland Railway under Fowler, with the solitary exception of the Lickey Banking engine. *[R. J. Blenkinsop*

# Fowler Locomotives

A
Pictorial
History by
Brian Haresnape

**Publisher's Note**
This book was first published in 1972 and statements made then were current. Many of these may well have been overtaken by subsequent events.

Readers will appreciate that this book was first published a number of years ago and that, in a number of cases, the reproduction of certain illustrations is not of the quality that can be achieved using modern methods of production.

First published 1972 by Ian Allan Ltd
Reprinted 1978
This impression 1997

ISBN 1 901945 00 6

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without permission from the Publisher in writing.

© Brian Haresnape 1972/1997

Published by Book Law Publications and printed by Ian Allan Printing Ltd at its works at Coombelands in Runnymede, England.

*Front cover:* 'Big Bertha' and a '3F' tank supply banking assistance to a train over the Lickey incline between Bromsgrove and Blackwell.

# Contents


| | | |
|---|---|---|
| | Introduction | 7 |
| Section 1 | Class 4 (4F) 0-6-0 Goods Engines | 14 |
| Section 2 | Class 5P5G (7F) 2-8-0 SDJR Mineral Engines | 24 |
| Section 3 | 0-10-0 Lickey Banking Engine | 32 |
| Section 4 | Class 4 (4P) 4-4-0 Compounds | 37 |
| Section 5 | Class 3 (3F) 0-6-0T Shunting Engines | 49 |
| Section 6 | Class 4 (5P4F, 5P5F, 5F) 2-6-0 Mixed-Traffic | 61 |
| Section 7 | 2-6-0 : 0-6-2 Mineral Engines. Garratt type | 69 |
| Section 8 | Class 6 (6P) 4-6-0 'Royal Scots' | 77 |
| Section 9 | Class 4P 2-6-4T Passenger Tank Engines | 89 |
| Section 10 | Class 2P 4-4-0 Light Passenger Engines | 94 |
| Section 11 | Class 2F 0-6-0T Dock Tanks | 100 |
| Section 12 | 4-6-0 Experimental High Pressure Engine | 103 |
| Section 13 | Class 7F 0-8-0 Mineral Engines | 107 |
| Section 14 | Class 3P 2-6-2T Passenger Tank Engines | 111 |
| Section 15 | Class 5XP (6P) 4-6-0 'Patriots' | 118 |
| Appendix | Named Locomotives | 126 |
| | Bibliography | 128 |

For my good friends and fellow enthusiasts,
John Kite and Alec Swain

# Introduction

A story which has been widely circulated over the years claims that on one convivial occasion, Sir Henry Fowler laughingly remarked that he had never designed a locomotive in his life. Whether or not this can be considered true rather depends on how one interprets the word 'designed'. It is certainly a matter for academic debate just what degree of direct influence Sir Henry Fowler did have upon some of the locomotive designs ascribed to his name. What must be accepted, however, is that he held the ultimate responsibility for these designs, and that when he agreed the completed drawings for a new type to go into production, it was on his head that the eventual bouquets or brickbats would fall! One suspects therefore that he was careful to see that everything was produced to his personal satisfaction.

Unlike Gresley on the Great Northern or Churchward on the Great Western, Fowler does not, in retrospect, seem to have been so passionate about the achievements in service of the locomotives produced during his two regimes as Chief Mechanical Engineer; first on the Midland Railway (1910-1922) and then on the London Midland and Scottish Railway (1925-1930). This is in no way meant to suggest any belittlement of his contribution to the British Steam Locomotive saga, indeed it must be recognised from the outset that in many ways his true status has been overshadowed by the emphasis frequently placed upon later LMSR events, and by the constant repetition of the strange affair of the Royal Scots—of which more *anon*.

Henry Fowler was an all-round engineer and a most able and efficient organiser. His initial appointment to the Midland Railway Company was in June 1900, when he became Gas Engineer and Chief of the Testing Department, having previously held a similar position on the Lancashire and Yorkshire Railway. Prior to entering the railway world he had been involved in road motor engineering, in its early and somewhat uncertain development stages. By late 1905 he was promoted to the position of Assistant Works Manager at Derby, becoming Works Manager in May 1907.

The new post of Chief Mechanical Engineer was created upon the somewhat premature retirement of Richard Deeley in 1909. Deeley had been Locomotive Superintendent since Johnson's retirement in 1904; his relatively short tenure in office is allegedly due to a clash of personalities with the management of the day. The story of this period of Derby affairs in well told in J. B. Radford's book *Derby Works and Midland Locomotives* and does not require repetition here. The important point in our present narrative is that the post of Locomotive Superintendent was replaced by two new ones: those of Chief Mechanical Engineer and Chief Motive Power Superintendent; a move taken to remedy the worsening situation in Midland traffic. This split of responsibilities was to have many interesting repercussions in later years; particularly when the Midland Railway was absorbed into the LMSR system.

In Midland days Derby was an unquestionable stronghold in locomotive affairs. At the time of Fowler's appointment as CME there was an unbroken line of development dating from the days of Kirtley, followed by Johnson's lengthy regime (1873-1903) and fortified by Deeley's work. True, if one

looked further afield, there were more exciting developments taking shape in other British locomotive drawing offices, and it can be argued with some justification that Derby was soon to be left behind, particularly in the design and development of the modern 20th century express passenger steam locomotives of 4-6-0 and 4-6-2 wheel arrangement. To what extent the blame for this lagging-behind should go to Fowler remains debatable.

Several factors influenced locomotive design policy in late Midland Railway days. Route restrictions, in terms of weight per foot run, were severe, and yet the mineral traffic in particular, was very heavy. The development of relatively small locomotives able to run within the stringent requirements of the Civil Engineer inevitably led to constant double-heading, both on passenger and freight work. True, the average weight of an MR passenger train was somewhat under 250 tons, but in periods of heavy traffic, double-heading was freely resorted to. The Midland Railway Operating Department happily pursued its 'small engine' policy, despite the costs involved in using two engines to work one train. They went to the expense of providing double water columns to avoid drawing up the train twice.

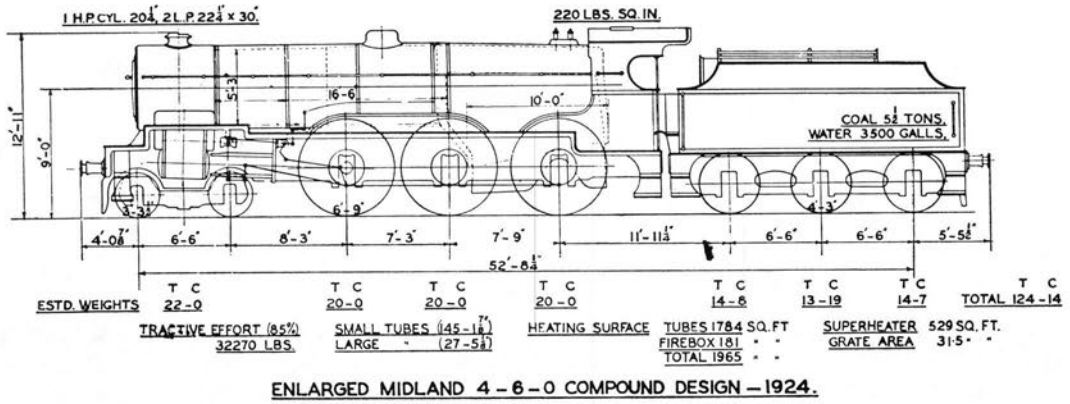
This policy remained unchanged for the entire period of Fowler's office as CME on the Midland, but there is some evidence that both he, and Deeley before him, were not satisfied. Schemes were in fact drawn-up for a number of larger locomotives, but the Civil Engineer's restrictions could not be overcome. Fowler, for instance, gave serious consideration to a 2-8-0 goods locomotive in 1920, based upon the existing SDJR design, but the proposed order for 100 engines had to be abandoned in favour of further class 4 0-6-0s, in the 1924 programme.

That Fowler was not personally averse to large locomotives is further demonstrated by the design and construction of the unique 0-10-0 Lickey Banking engine in 1914/19. For passenger working, Deeley had proposed a 4-6-0 development of the compound 4-4-0s, but the 'small engine' policy persisted, and the Midland still had nothing larger than their simple and compound 4-4-0s for passenger work, when absorbed by the LMSR.

Such, broadly speaking, was the backcloth to Midland locomotive affairs from 1910-1922, and during this period considerable cost and effort was put into modernising the existing fleet of small engines, by reboilering and superheating. Few new locomotives were constructed.

It would be practical at this stage, to retrace our steps in order to record Fowler's own progress since his appointment in 1910. The programme of rebuilding was proceeded with steadily, producing in the case of the 483 class two-cylinder 4-4-0s what were in many instances virtually new engines; with new frames, cylinders and boilers. The outbreak of World War 1 disrupted the peaceful

Sir Henry Fowler's proposed development of Deeley's enlarged Compound 4-6-0 design; 1924.




ENLARGED MIDLAND 4-6-0 COMPOUND DESIGN—1924.

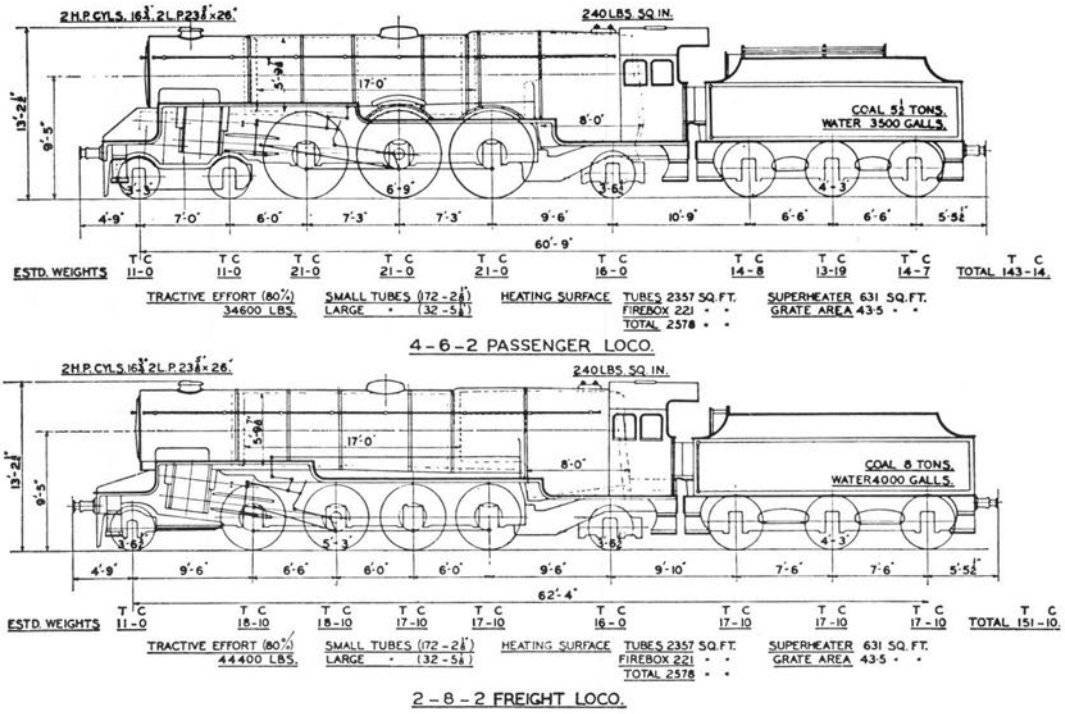
progress at Derby. Fowler left his railway post to become Director of Production at the Ministry of Munitions in June 1915, and in September 1916 he was appointed Superintendent of the Royal Aircraft Factory, South Farnborough. Further promotion followed in January 1918, when he became Assistant Director of Aircraft Production. He was awarded the CBE for his services in 1917 and received a knighthood in January 1918. At the end of May 1919 Sir Henry Fowler returned to his post as CME of the Midland Railway. Derby works had meanwhile been producing war munitions rather than new locomotives.

On January 1, 1923 the London Midland and Scottish Railway Company, largest of the 'Big Four' railways, came into being. The new company embraced the lines and equipment of the former Midland; London and North Western; Lancashire and Yorkshire; Furness; North Stafford; Caledonian; Highland and Glasgow and South Western Railways, plus many smaller lines. The widely varying locomotive practices of these companies had to be welded together for future development. The LMSR inherited 10 316 steam locomotives of 393 different types. Generally speaking, once comparisons had been made, it was found that the smaller, older types (up-dated by provision of superheaters) were more efficient than the newer and larger engines; a sad state of affairs.

The new company lacked a new modern express passenger locomotive suitable for the Anglo-Scottish route, also a versatile modern mixed-traffic type, a large general-purpose tank and a large main line freight type. In these respects the new LNER, GWR and (to a lesser extent) SR systems, were far better off.

The first CME of the new company was George Hughes. He had been CME of the Lancashire and Yorkshire Railway since 1904. In 1922 he had been placed in charge of the locomotive department of the newly combined LYR and LNWR concern. Sir Henry Fowler remained at Derby, as assis-

Fowler's 1926 Compound Pacific design for the LMSR.



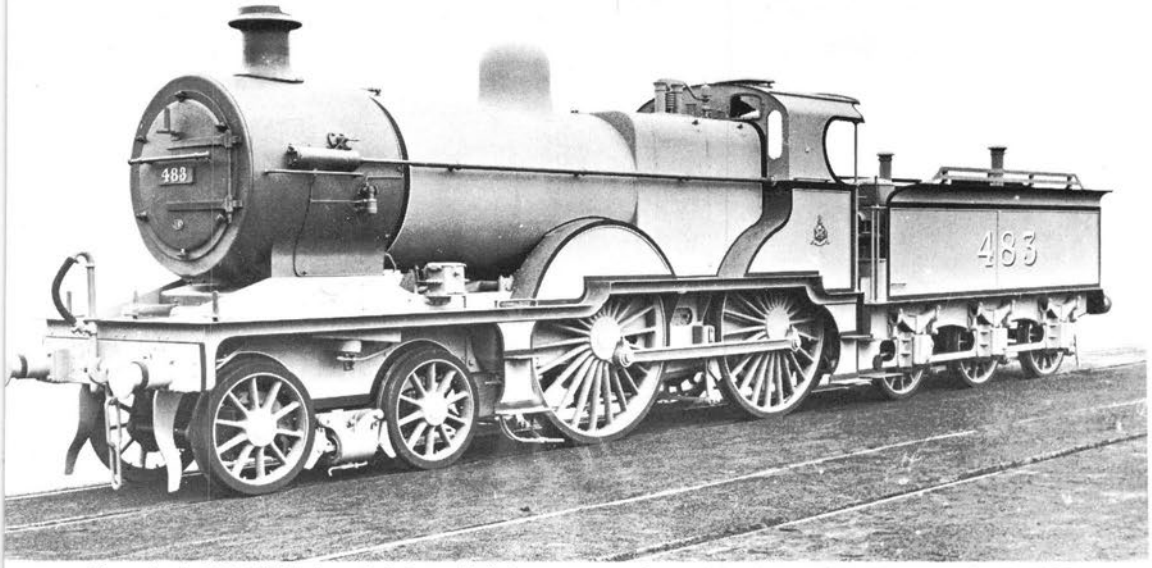

SIR HENRY FOWLER'S DESIGNS FOR LARGE 4 CYL. COMPOUND LOCOS. – 1926.

Sir Henry Fowler's designs for large four-cylinder compound locomotives; 1926.

tant to Hughes. The first Superintendent of Motive Power for the whole LMSR system was James Anderson, previously Works Assistant at Derby. In Deeley's day James Anderson had been Chief Locomotive Draughtsman at Derby. Hughes chose to remain at the somewhat isolated former LYR Horwich works, and it was there that the earliest LMSR locomotive developments took place. But both Beames at Crewe and Fowler at Derby continued to have a measure of control over their own affairs.

The appointment of Anderson (together with other Midland men who took top managerial positions) ensured that the Derby 'small engine' policy would be kept alive if possible. E. S. Cox has described this extension of Midland policy and practice into LMSR affairs as 'Midlandisation'. These men argued for the selection of existing Midland locomotive types for future LMSR standardisation, and for the application of Midland detail design to any new locomotives it might be found necessary to introduce. As for the existing multitude of non-Midland types inherited by the LMSR: these were to be left unchanged until broken-up (*as soon as possible*, one suspects they muttered under their breath!) Cox states in his excellent paper *A Modern Locomotive History* read to the Institution of Locomotive Engineers in April 1946, that there was some justification for taking this course, apart from the natural predilections of the men in charge.

First of all, it had been established that Midland design practice was productive of the lowest repair costs; with good lubrication and good robust detail fittings, plus simple construction. Secondly, coal consumption was lower than for other existing comparable power, as the Midland used rugged valve gear giving accurate timing, plus good boilers. Thirdly, the decision to




The rebuilt MR '483' class 4-4-0s, which in many cases were virtually new engines, are not included in the present volume, although they formed the basis of the later standard LMSR class 2 4-4-0 design. *[British Rail LM Region*

standardise on the design of one of the constituent companies, rather than branch out into a completely new range of standard locomotive types, meant that some 3 000 or so locomotives were already standard in respect of their design and fittings, thereby saving costs for spare parts. Thus it came about that four designs, largely influenced by Fowler, namely the class 4 0-6-0 goods, the class 3 0-6-0T, the class 4 Compound 4-4-0 and the class 2 4-4-0, were standardised for new LMSR construction, with only minor alterations.

Hughes produced a competent mixed-traffic 2-6-0 design—the 'Crab'—but there remained a need for a new large express passenger locomotive and a corresponding large freight design. Hughes retired in 1925 and Sir Henry Fowler was appointed CME in his place. Transfer of power to Derby was swift, and for the next five years all things Midland were bright and beautiful. And yet even within the home camp there was disagreement as to what shape any new power should take.

Hughes had drafted a preliminary design for a four-cylinder Pacific together with a large 2-8-2 freight engine. The Operating Department did not really favour the adoption of such large engines, but by 1925 the need for a larger engine for the Anglo-Scottish route was again being voiced, despite the 'small engine' policy. Fowler naturally at first thought along the lines of a resurrection of Deeley's 4-6-0 Compound proposal and a drawing was prepared for such an engine (Fig 1). Fowler was, however, impressed by the progress with compounding in France, where the work of the new Nord Pacifics was gaining considerable praise in locomotive circles. He therefore decided to develop the earlier Hughes 4-6-2 proposal as a four-cylinder compound design, along with the 2-8-2 freight engine

(Figs 2 and 3) which would use the same boiler and details. The Pacific design actually proceeded some considerable way towards completion, and some cylinders were cast. At this juncture, in 1926, a series of events arose which put paid to these engines and resulted in the construction of the Royal Scot class 4-6-0s.

The circumstances leading up to the introduction of the Royal Scots were somewhat dramatic, and were largely the result of scepticism on the part of the Operating Department as to the desirability of introducing the new large Compound express engines; particularly in view of the 4-6-2 wheel arrangement proposed. Anderson was a firm believer in the least number of cylinders and wheels to do the job. The exact circumstances have yet to be revealed, but the Operating Department somehow persuaded the Great Western Railway to lend them one of their new Castle class engines. The object of this was to show the directors and management exactly what kind of engine they really required. Sir Henry Fowler's attitude to these somewhat underhand negotiations remains unknown, but one may guess that he viewed the proceedings with some displeasure.

September 1926 witnessed the arrival of GWR Castle class No. 5000 on the LMSR scene, where it was put to work first of all on the Euston to Crewe run and then to Carlisle. The engine showed its supremacy over all existing types, and the general performance and economics were such that work on the Fowler Pacific was stopped. Apparently the LMSR Board then stated their wish to have 50 locomotives built to the GWR Castle class design, but this was not possible, partly because of loading gauge problems. Anderson, and his overlord, J. H.

The Midland Railway took over the London Tilbury and Southend line in 1912. During Fowler's regime a number of new 4-4-2Ts were built to the existing Whitelegg design. As only the detail fittings were influenced by Fowler they are not included in the present volume. No. 2111, seen here on a Southend express, was built at Derby in 1923. *[Stanley J. Rhodes*

Follows, then resolved that what was required was a three-cylinder 4-6-0 design with a maximum size boiler, high degree superheat and long travel valve gear. The engine was required in time for the following summer's timetable, when it was proposed to introduce a new show-piece train on the Anglo-Scottish services; a train which it was beyond the capacity of any existing LMSR engine to work single-handed.

Fifty new 4-6-0s were ordered straight off the drawing-board, with only an outline idea of what was wanted. To assist the North British Locomotive Company, who were given the contract to design and build the engines, a complete set of working drawings for the new SR Lord Nelson class 4-6-0s were borrowed for consideration in the design stages; a similar request to Swindon for a complete set of Castle class drawings having produced no response. The subsequent story of the new Royal Scot 4-6-0s is dealt with in Section 8, page 000, and it will suffice here to say that they proved excellent engines. As to what might have been, had Fowler been allowed to complete construction of his compound 4-6-2, that must rest in the imagination of the reader.

Sir Henry Fowler ceased to take an active part in the locomotive affairs of the LMSR at the end of 1930. By that time Derby had influenced the locomotive stock of the company in no uncertain manner. A definite design trend had emerged with the more successful types produced during the Fowler regime, in particular the 2-6-4Ts and the Royal Scots, which combined the traditional robust Midland construction with the desirable modern features of higher working pressure, high degree superheat, long travel valve gear and generously proportioned bearings.

The aim of the present volume is to present, in largely pictorial terms, a *resumé* of the Fowler locomotives of the MR and LMSR, showing them in typical day-to-day roles. As such it is intended as a companion volume to my *Stanier Locomotives* pictorial history, published some three years ago. I do not pretend that the data given in these pages is exhaustive; that would require a far bulkier volume, but I do hope that a fair and as far as possible, unbiased, picture of the engines is presented to the reader.

The aesthetic appearance of Sir Henry Fowler's designs might be described as simple and straightforward. Most of the characteristic features seem to have originated in the Deeley era, and it was left to Stanier to make a complete break from Midland practice so far as locomotive appearance was concerned. Nevertheless the Fowler engines possessed a distinct personality of their own, as I hope a glance through the following pages will demonstrate. Some of his engines were of humble nature, but all performed most useful tasks in the day-to-day running of a great railway system.

The locomotives described in the following pages are those built new during Sir Henry Fowler's regime. For space reasons I have excluded the locomotives of the Northern Ireland NCC system, also sundry small Sentinel shunters and railcars. The 4-4-2T locomotives of the former London, Tilbury and Southend Railway, of Whitelegg design, modified by Fowler with Midland fittings are also excluded.

During compilation of this pictorial history I have been fortunate in having the willing assistance and advice of a number of enthusiasts, in particular John Edgington, Peter Rowledge and Alec Swain. For help given in obtaining photographs I am deeply grateful to the following photographers: E. D. Bruton; H. C. Casserley; Derek Cross; P. H. Groom; F. R. Hebron; T. G. Hepburn; Ivo Peters; Eric Treacy and P. H. Wells. For other assistance and advice, my thanks to E. S. Cox; John F. Clay; Ken Hopkins and David Jenkinson. The line drawings are reproduced by courtesy of the *Railway Gazette* and Ian Allan Ltd.

*Brian Haresnape* FRSA NDD
*December, 1971*

# Section: 1 0-6-0 Class 4; later 4F Goods Engines

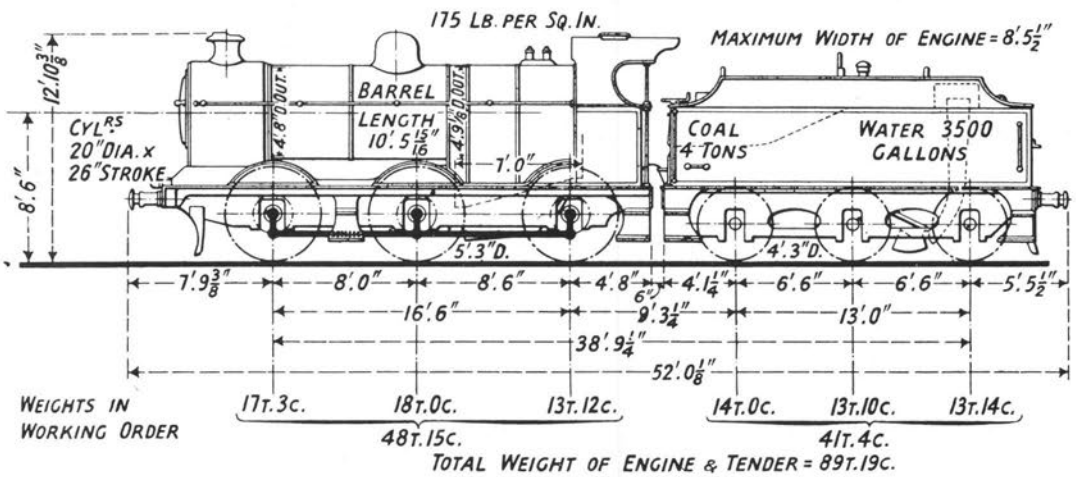
Introduced: 1911 Total: 772*

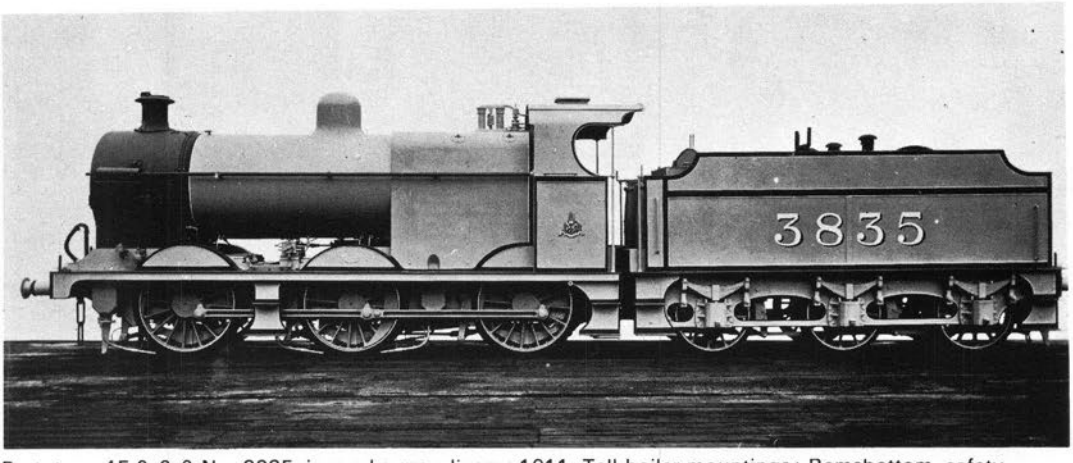
Mineral traffic on the lines of the Midland Railway was a business of prodigious proportions, whilst the routes covered were the subject of severe weight and width limitations. The outcome of this was the frequent resort to double-heading of locomotives, and pairs of medium-sized 0-6-0s were daily to be seen trundling up and down the Midland lines on lengthy coal trains. In fact, on the Toton to Brent coal traffic, the limitations of line occupation dictated heavy loads, which were permanently rostered to double-headed 0-6-0s. The 0-6-0 goods engine was indeed the 'maid-of-all-work' of the Midland Railway and it was natural that Fowler should give his early attentions to improving the design of this breed. Some thought was given to an inside-cylinder 2-6-0 design in 1910, but in October 1911 the first of two prototype 0-6-0 goods tender engines was completed at Derby.

These two locomotives were in fact a straightforward development of the existing standard saturated 0-6-0 design. Henry Fowler had a personal interest in superheating and he initiated superheating experiments on the two prototypes. The first, No. 3835 had a Schmidt type superheater with Midland type element fixing, whilst No. 3836 (which emerged from Derby shops in November 1911) had a Swindon double-pass type superheater. Both locomotives carried the new standard Midland G7S type boiler. In his book *Derby Works and Midland*

***192 Midland Railway**
**5 Somerset & Dorset Joint Railway**
**575 London Midland & Scottish Railway**

The drawing shows one of the LMSR batch, post 1923.



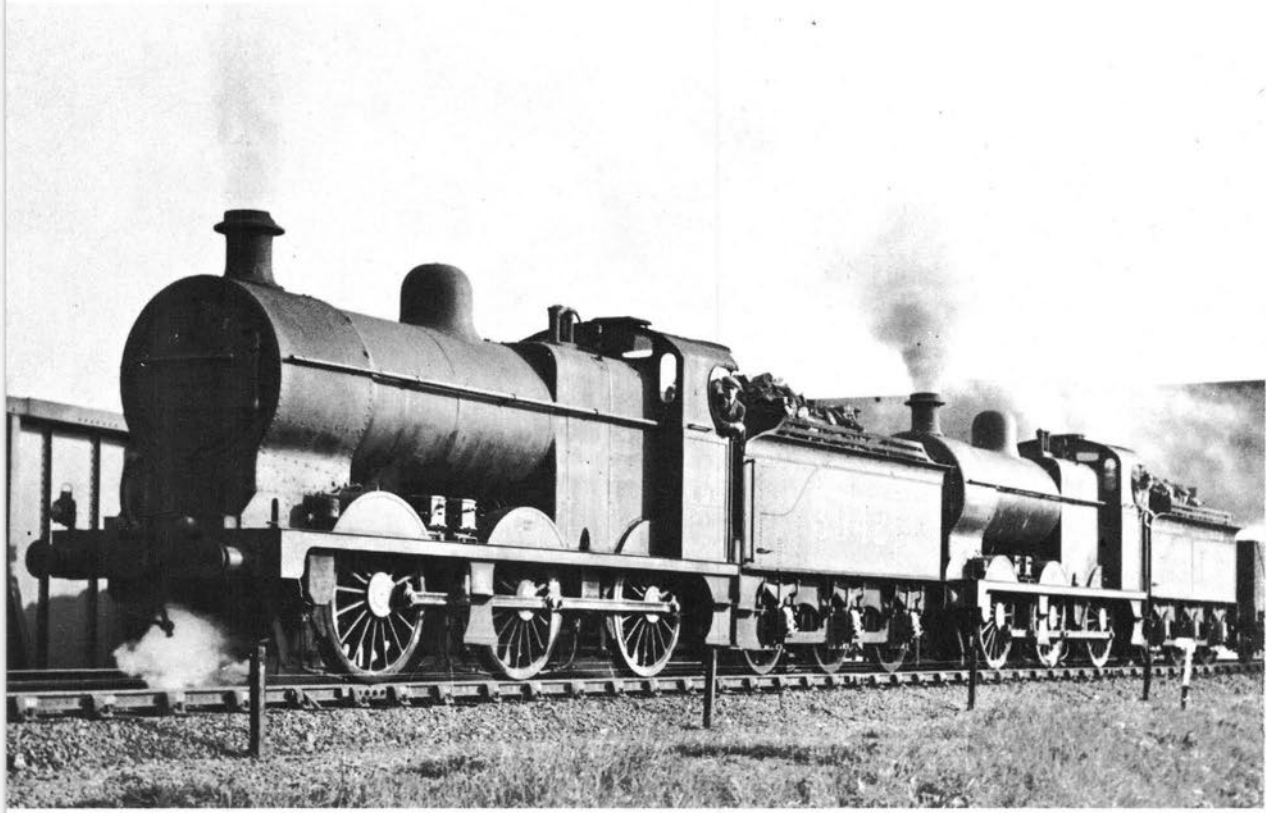



Prototype 4F 0-6-0 No. 3835, in works grey livery; 1911. Tall boiler mountings; Ramsbottom safety valves; fluted side rods. *[British Rail LM Region*

A decidedly grubby MR 4-2-2 is assisted by 4F 0-6-0 No. 3870 on an up coal train near Oakley junction, *circa* 1918. *[F. W. Goslin*

*Locomotives,* J. B. Radford gives details of comparative trials held with the two prototypes, alongside two of the earlier saturated 0-6-0s, the outcome of which was that No. 3835 proved the best performer.

As delivered new, No. 3835 had 20in by 26in inside cylinders with piston valves having inside admission operated by Stephenson link motion through rocking shafts. The cylinders on No. 3836 were 19in x 26in. The original boiler pressure of the G7S boiler on No. 3835 was 160 lb per sq in and the boiler carried 148 small and 21 large tubes which together with the 21 element superheater and firebox heating surface of 125 sq ft produced a total of 1 483 sq ft. The coupled wheels were 5ft 3in diameter spaced to the almost sacred Derby standard of 8ft and 8ft 6in. Secondhand tenders from two 4-4-0 locomotives were fitted, with



Typical double-headed coal train on the Midland main line, near Hendon in 1927, with MR-built 4F 0-6-0s Nos. 3942 and 3856. *[H. C. Casserley*

2 950 gallon water and 4 tons coal capacity. The weights in working order were 49 tons 2 cwt for the engine and 39 tons 2 qtr for the tender giving a total locomotive weight in working order of 88 tons 2 cwt 2 qtr.

No further examples of the class were built until 1917 when a batch of fifteen were produced, commencing with No. 3837. Working pressure of the G7S boiler was raised to 175 lb per sq in and the cylinder dimensions were settled at 20in diameter by 26in stroke. Construction of further new engines proceeded steadily up to the end of 1922, and in that final year of pre-Grouping existence five locomotives were supplied to the Somerset and Dorset Joint Railway. All the Fowler 4F 0-6-0s built under Midland Railway auspices were fitted with Ramsbottom safety valves and many of the earlier batches had secondhand tenders from older passenger locomotives or the American Schenectady 2-6-0 goods engines. Commencing with No. 3877 new 3 500 gallon coal-rail low sided tenders were supplied.

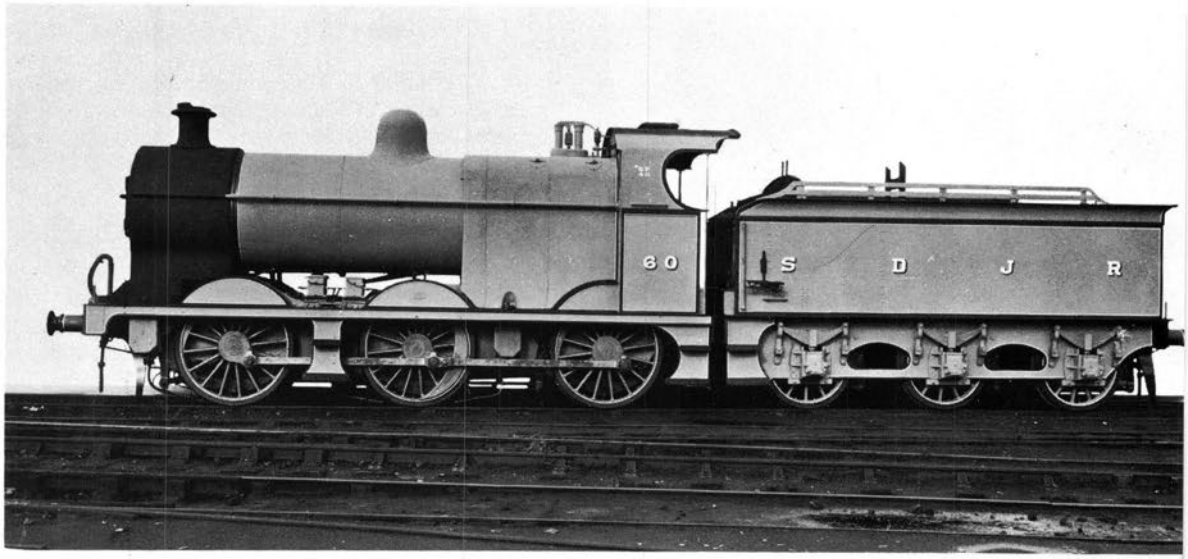
The engines for the MR were built as follows:

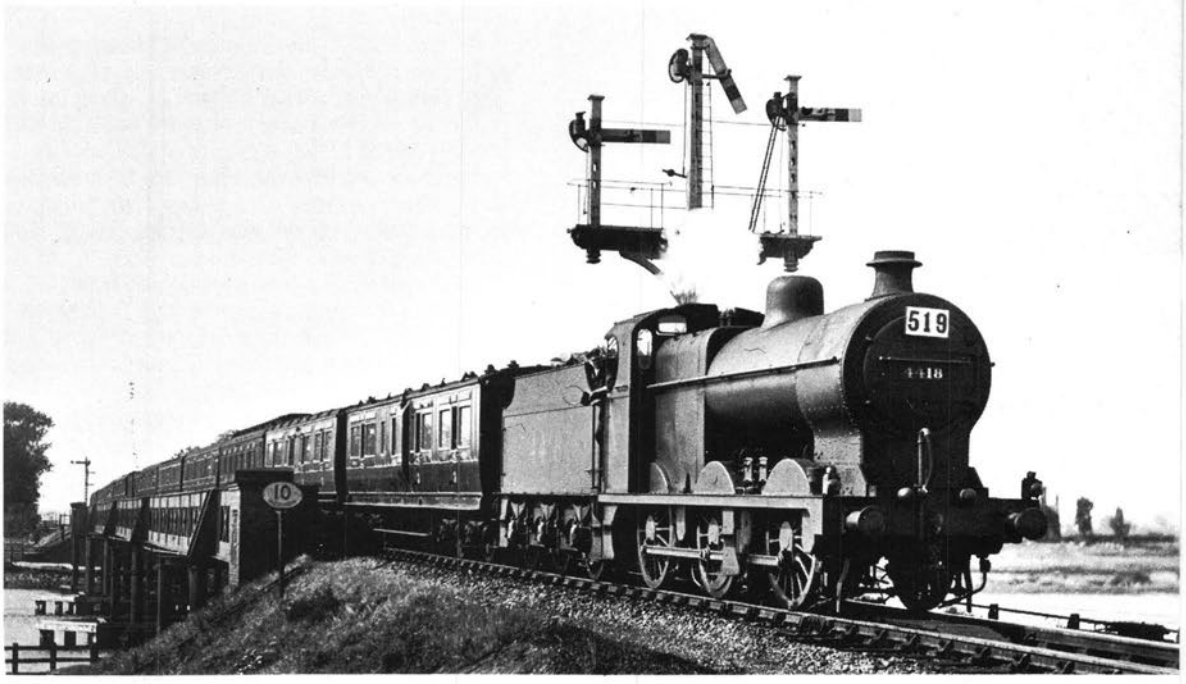
| | | |
|---|---|---|
| Nos 3835-3836 | Derby | 1911 |
| Nos 3837-3851 | Derby | 1917 |
| Nos 3852-3886 | Derby | 1918/19 |
| Nos 3887-3901 | Derby | 1919 |
| Nos 3902-3936 | Derby | 1920/21 |
| Nos 3937-3986 | Armstrong-Whitworth | 1921/22 |
| Nos 3987-4026 | Derby | 1921/22 |

The five locomotives delivered to the SDJR (which classified them 5P4G) were built as follows:

| | | |
|---|---|---|
| SDJR Nos 57-61 | Armstrong-Whitworth | 1922 |

These five locomotives were taken into




*Top:* Photographed in works grey livery, No. 60 built by Armstrong-Whitworth for the Somerset and Dorset Joint Railway in 1922; one of a batch of five numbered 57-61 which later became LMSR Nos. 4557-4561. The SDJR classified them 5P4G. Right-hand drive and Ramsbottom safety valves; flat side rods. SDJR tablet exchanging apparatus on leading end of tender.
*[British Rail LM Region*

*Above:* A Yarmouth excursion near Kings Lynn, on the M & GNJR; 1934. The locomotive is 4F 0-6-0 No. 4418, built at Derby in 1927 and is in original state, with Fowler chimney and piston tail rod guides protruding from the front bufferbeam. The fireman is holding the single line tablet ready to hand to the signalman. The load of eleven carriages is a good reminder of the palmier days of rail excursions; no small task for a 4F to handle. *[F. R. Hebron*

Midland Railway Fowler 4F 0-6-0 in BR days, as No. 43923. Various minor changes have been made to the locomotive since it was built at Derby in 1921, in particular substitution of Ross pop safety valves, a Stanier chimney and removal of the piston tail rod guides. The locomotive retains the beading on the splashers, a feature of the MR-built 4Fs that was not perpetuated on the LMSR batches. No. 43923 was photographed near Bakewell with a northbound freight in July 1963, assisted at the rear by a 2-6-4T. The locomotive retains right-hand drive.

*[Gerald T. Robinson*

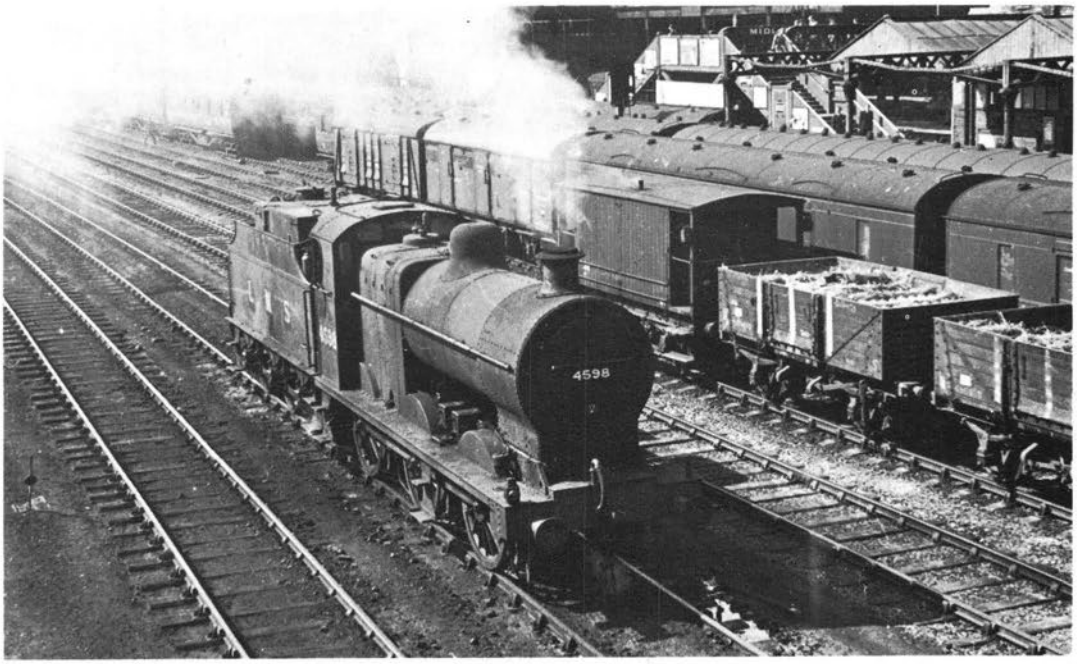
LMSR stock in 1930 and renumbered 4557-4561.

The 4F 0-6-0 goods engine was one of the former MR designs selected by Follows and Anderson for future standardisation on the newly created London Midland and Scottish Railway. Fowler acquiesced, and authorised only minor alterations to the design, which the Derby drawing office and the building works carried out. As it existed in this modified state, the design still had certain definite weaknesses, in particular the front end design and the undersized axlebox bearings. The MR batches had right hand drive and even this feature was perpetuated on the initial LMSR batches, but from No. 4207 onwards the standard left hand drive was adopted. Ross pop safety valves replaced the Ramsbottom version and changes were made in the height of the boiler mountings to increase route availability.

All the LMSR engines were vacuum fitted and the majority had steam-heating hose and screw couplings. Tractive effort at 85 per cent of the boiler pressure was 24 555 lb. On the LMSR batches the two inside cylinders were 20in diameter by 26in stroke; the boiler pressure was set at 175 lb per sq in. The boiler barrel was composed of two telescopic rings $\frac{9}{16}$in thick, with a mean diameter of 4ft 8in and a length of 10ft 10$\frac{1}{2}$in. The Belpaire firebox had a heating surface of 123 sq ft and a grate area of 21 sq ft. The tubes and flues provided a heating surface of 1 034 sq ft with a total evaporative surface of 1 157 sq ft. The superheating surface varied on individual engines, between 253 sq ft and 313 sq ft. Most of the LMSR batches received new standard 3 500 gallon Fowler tenders; a few variations are included in the illustrations.

*Below:* The abortive oil-burning conversion programme of 1946-47 authorised the conversion of 485 locomotives of the following classes: 4-6-0 5P5F (5); 0-6-0 4F (16); 0-8-0 7F (175); Garratt (33); SDJR 2-8-0 (11) and 2-8-0 8F (245). In fact only 25 locomotives were actually converted before the scheme was abandoned. These included four 4F 0-6-0s, Nos. 4466, 4522/85/98 and these reverted to coal burning in 1948. This rare photograph of an oil-burner actually in steam shows No. 4598 running light engine through Derby station in May, 1948. This locomotive was one of those built during the Stanier era (see page 20).
*[H. C. Casserley*

*Bottom:* Right-hand drive 4F 0-6-0 No. 44188, photographed at Woodford Halse in June 1965. The tender is a hybrid Fowler/Deeley version dating from the 1939-45 war period, with a Fowler tank mounted upon a Deeley frame, hence the gap of about 9in between the rear of the tank and the rear bufferbeam. No beading to tank sides; which carry no emblem. Standard BR chimney casting. *[J. Davenport*



The LMSR batches were built as follows:

| | | |
|---|---|---|
| Nos 4027-4034 | Derby | 1924 |
| Nos 4035-4056 | Derby | 1925 |
| Nos 4057-4081 | North British | 1925 |
| Nos 4082-4106 | Kerr, Stuart | 1925/6 |
| Nos 4107-4158 | Crewe | 1924/5 |
| Nos 4159-4176 | Crewe | 1926 |
| Nos 4177-4178 | St. Rollox | 1924 |
| Nos 4179-4206 | St. Rollox | 1926 |
| Nos 4207-4216 | Derby | 1925 |
| Nos 4217-4287 | Derby | 1926 |
| Nos 4288-4301 | Derby | 1927 |
| Nos 4302-4311 | Crewe | 1926 |
| Nos 4312-4322 | St. Rollox | 1927 |
| Nos 4323-4331 | St. Rollox | 1928 |
| Nos 4332-4342 | Kerr, Stuart | 1926 |
| Nos 4343-4356 | Kerr, Stuart | 1927 |
| Nos 4357-4361 | Andrew Barclay | 1926 |
| Nos 4362-4381 | Andrew Barclay | 1927 |
| Nos 4382-4399 | North British | 1926 |
| Nos 4400-4406 | North British | 1927 |
| Nos 4407-4436 | Derby | 1927 |
| Nos 4437-4446 | Crewe | 1927 |
| Nos 4447-4456 | Crewe | 1928 |
| Nos 4457-4466 | Horwich | 1928 |
| Nos 4467-4476 | St. Rollox | 1928 |
| Nos 4477-4506 | North British | 1927 |
| Nos 4507-4556 | Crewe | 1928 |

It can be seen from the above list that construction proceeded apace, particularly in the period 1926-28, with not only the LMSR-owned workshops at Crewe, Derby, Horwich and St. Rollox, but also three private builders undertaking simultaneous construction.

Perhaps the most surprising chapter in the long story of the 4F 0-6-0s was the decision taken by Stanier to allow construction of further batches of the design, commencing in 1937—no less than 27 years after No. 3835 had been delivered from Derby. The reasons behind this were that although Stanier had proposed alternative modern designs of standard 0-6-0, and also a 2-6-0 development of his very successful 2-6-4T, the Operating Department made it clear that additional 4Fs would suit their requirements admirably. Not until the post-war 2-6-0 designs of H. G. Ivatt appeared on the LMSR scene was any real improvement made to this retrograde aspect of LMSR locomotive affairs.

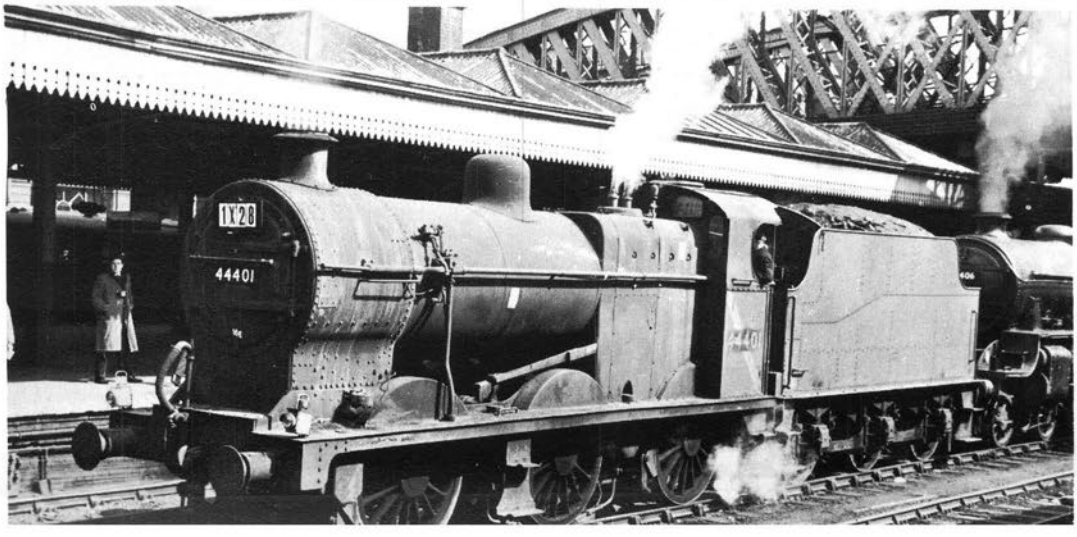
The batches built under Stanier's authority were as follows:

| | | |
|---|---|---|
| Nos 4562-4576 | Crewe | 1937 |
| Nos 4577-4596 | Derby | 1939 |
| Nos 4597-4604 | Derby | 1940 |
| Nos 4605-4606 | Derby | 1941 |

It may be deduced from the extremely slow rate of construction that these engines did

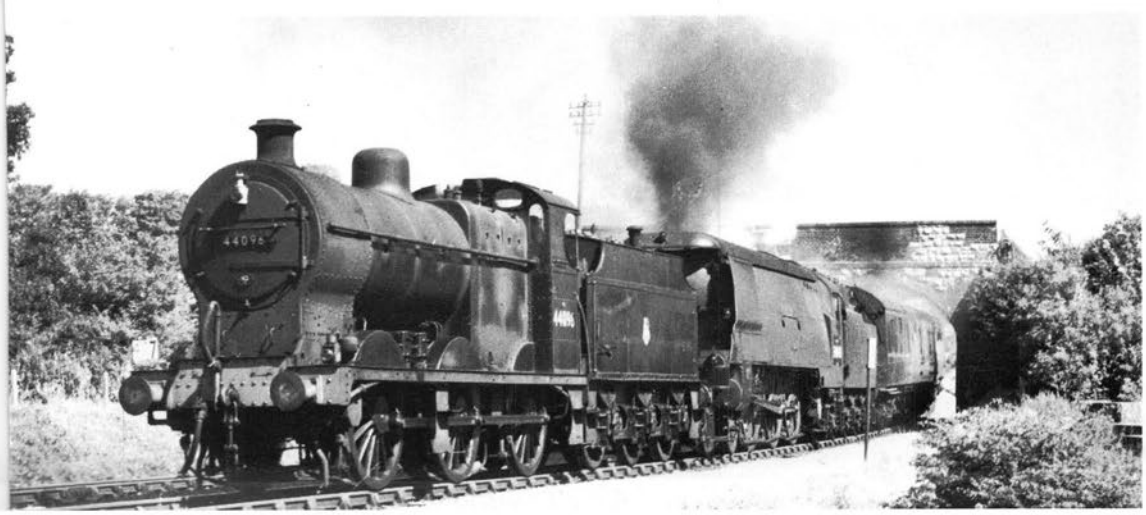
The high-sided version of the Fowler 3 500 gallon tender, which eliminated the need for coal rails to increase capacity, of which only 10 were built, emerged in early Stanier days for attachment to 10 Crewe-built Jubilee class 4-6-0s. Their subsequent wanderings, as locomotives exchanged tenders for one reason or another, makes fascinating work for the enthusiast researcher!

In 1939/40 seven of them were attached to new 4F 0-6-0s Nos. 4578/87/94/96/99, 4601/02 constructed to Stanier's order. The other three had more varied careers and it is probably one of these which is seen here paired with 4F No. 44401, photographed at Nottingham Midland on special duty double-heading with ER B1 class 4-6-0 No. 61406. *[Alec Swain*



*Below:* No. 44593, one of the 4Fs built during Stanier's regime, in 1939. Plain side rods and no piston tail rods were features of these final batches. Stanier removed the piston tail-rods from Fowler's 4Fs and blanked-out the relevant areas on the bufferbeam with square patches. This particular locomotive had acquired a Fowler tender with cab shelter, when this photograph was taken at Stafford. Water tank breathers to rear of coal space. *[J. B. Bucknall*

*Bottom:* 4F No. 44096 assists Bulleid 'West Country' class SR Pacific No. 34043 *Combe Martin* with the 7.35 am Saturdays only Nottingham to Bournemouth train, seen climbing past Moorewood in August 1958. Steam-heating pipe on front bufferbeam. *[Ivo Peters*



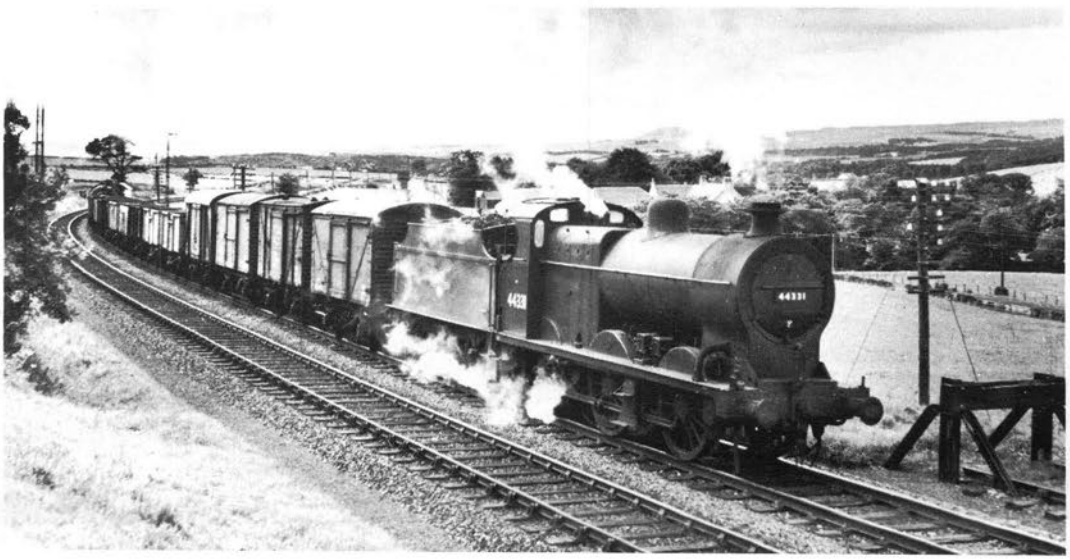
not rank very high on the list of priorities for the war effort ! These final 4F 0-6-0s had the characteristic Stanier chimney ; flat side rods, and were not fitted with tail rods.

The general usefulness of this large and somewhat unglamorous class of 0-6-0s was undeniable, and they were to be seen on a variety of duties in most parts of the widespread LMSR system. They were not as efficient as they could have been, with only relatively little alteration to the design of the front-end and the axleboxes, but their robust and simple construction was entirely in the traditions of Derby, and they may indeed be described as a classic example of the humble, but useful, British 0-6-0 goods engine.

**First of class withdrawn:** 43862(1954)
**Last of class withdrawn:** 44525(1966)
**Examples preserved:** 43924, 44027

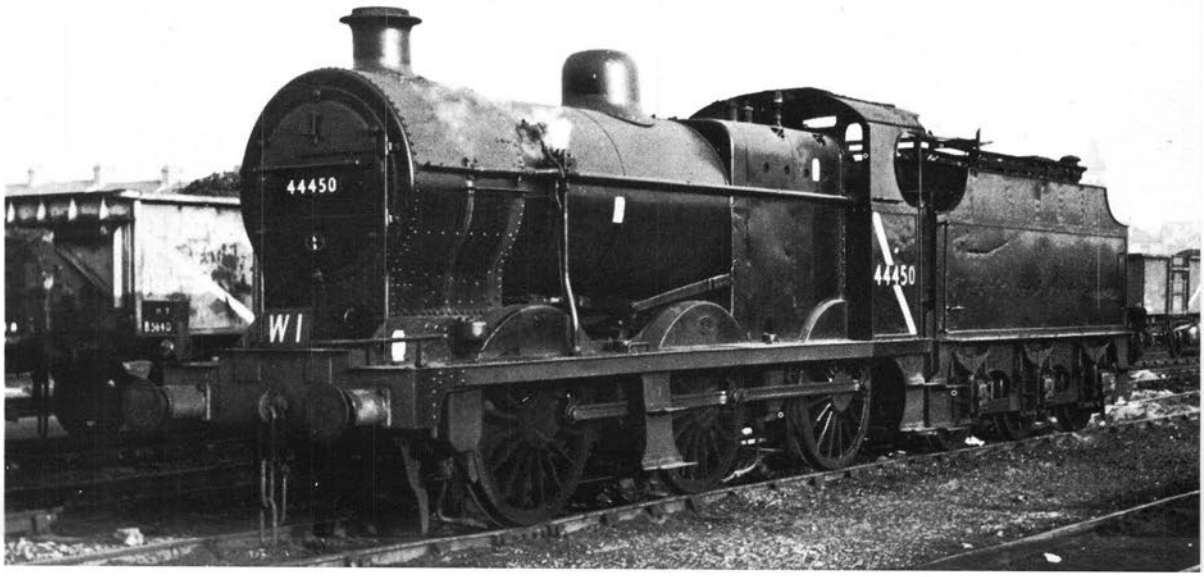
*Above:* Tender-first double-heading, No. 44370 assists Stanier 'Black Five' No. 45007 on a Kilmarnock to Barrhead train at Kilmaurs in April 1963. Standard Fowler 3 500 gallon tender, but not fitted with steam heating hose. *[Derek Cross*

*Below:* The original Fowler chimneys lasted longer on some of the 4Fs operating in Scotland, than elsewhere, as St. Rollox was not enthusiastic about replacing them with the Stanier version. No. 44331 was photographed at Dalrymple Junction working a Girvan to Ayr goods in August 1958. The locomotive has the elbowed steam pipe at the front end which indicates it was fitted with an exhaust steam injector. *[Derek Cross*



No. 44459 hurries a through Durham to Furness coke train over Tebay troughs in November 1953, with the weak sunshine glinting on a freshly painted smokebox and Stanier chimney. *[J. D. Mills*

Final condition of No. 44450, employed as a works' shunter at Crewe and carrying reporting number W1. The yellow diagonal stripe on the cabside indicated that the locomotive was prohibited from working under 25kv catenary, for clearance reasons. A standard BR chimney has been fitted, the vacuum pipe has been removed from the front bufferbeam and the locomotive has both screw and three-link couplings. The bufferbeam clearly shows the patches where the original piston tail-rod guides have been removed. Coal rails on tender; which carries no emblem. The locomotive was out of regular service and allocated for Departmental use. *[A. Swain*



## Section: 2

# 2-8-0 Class 5P5G (SDJR); later 7F
# Mineral Engines

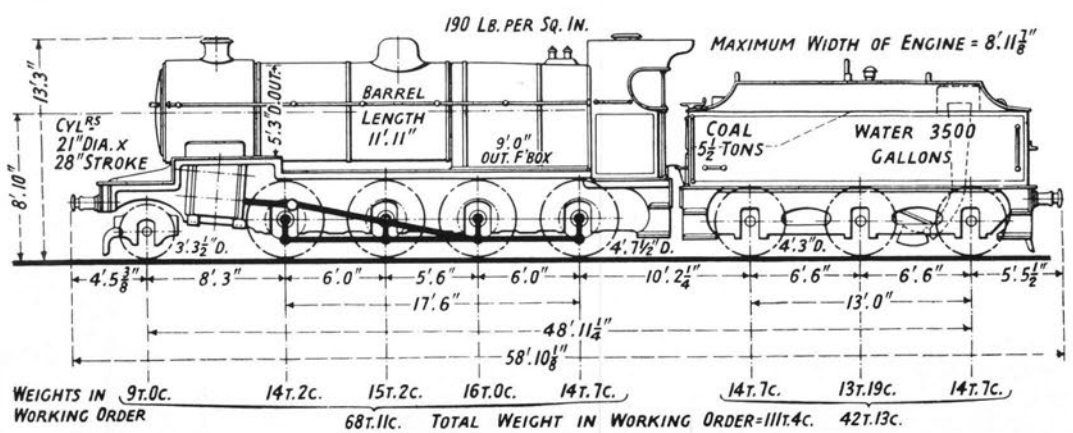
Introduced: 1914 Total: 11
Somerset & Dorset Joint Railway

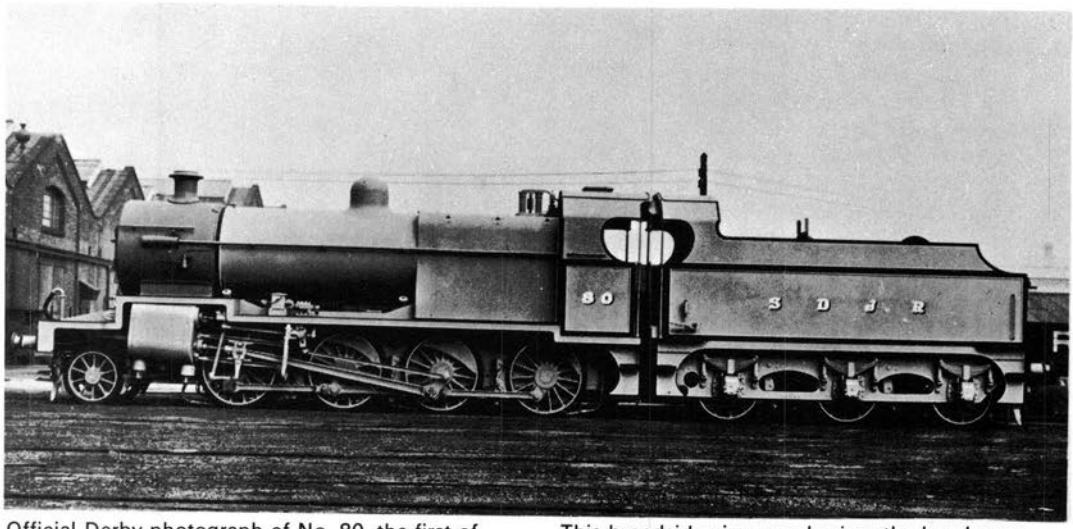
The Midland Railway was responsible for the locomotives and rolling stock of the Somerset and Dorset Joint Railway following the joint leasing of the line to the MR and LSWR in 1876. The mineral traffic from the Mendip Hills was its major source of revenue for many years and the line, which included long gradients of up to 1 in 50, was worked by medium-size 0-6-0s, which necessitated trains of limited load and the provision of numerous banking engines.

By 1911 it was obvious that the provision of larger and more powerful locomotives, to cope with this arduous route, had become a matter of some urgency and Mr. M. H. Ryan, at that time Locomotive Superintendent of the line, made repeated requests to Derby for a suitable design. As early as 1907, in fact, Derby had given consideration to two design proposals for outside-cylindered 0-8-0s for the SDJR, but neither was pursued. Henry Fowler entrusted James Clayton to drawing-up a new 2-8-0 design, retaining the outside cylinders of the earlier 0-8-0 proposals. On the 2-8-0 these were 21in diameter by 28in stroke, with outside admission short travel piston valves. Employment of outside cylinders in conjunction with outside Walschaerts valve gear was in fact a notable departure from existing Midland Railway practice for mineral engines, although Deeley had applied it (with slide valves) to his little 0-4-0T shunters of 1907. To clear the SDJR loading gauge (platform faces) the outside cylinders were inclined at 1 in 12.

Clayton drew-up a handsomely proportioned locomotive, which at the time of its introduction was one of the most powerful mineral engines in the country. A Com-

The drawing shows the second, 1925, version with large boiler.






Official Derby photograph of No. 80, the first of the class, delivered in February 1914. Shown here in works grey livery and with full lining-out and painted numerals, it was actually delivered to the SDJR in glossy un-lined black with brass cabside numerals. The power classification in SDJR days was 5P5G, altered to 7F by the LMSR in 1930.

This broadside view emphasises the handsome outline of the original design, with matching tender-cab, tall chimney and dome and cab-roof ventilator. The brakes on the leading pony truck are visible. Nos. 80-85 were right-hand drive engines and were originally fitted with steam operated reversing gear. *[British Rail*

pound-type G9AS boiler was used with a working pressure of 190 lb per sq in, using Ramsbottom safety valves. The heating surface of 1 328 sq ft was derived from 148 tubes providing 1 180 sq ft and the firebox 147.25 sq ft. The 21 tube Schmidt superheater gave 290.75 sq ft. Tractive effort at 85 per cent boiler pressure was rated at 35 392 lb. These are the official Derby figures, but an article in *The Locomotive* by P. C. Dewhurst in later years, gives a different set of values for the total heating surface, which would suggest that modifications were soon made, in particular by the increase of the superheated surface to 360 sq ft.

The driving wheels, of 4ft 7½in diameter were spaced at 6ft plus 5ft 6in plus 6ft centres, with a wheelbase of 17ft 6in. The leading pony truck wheels had a diameter of 3ft 3½in and were placed 8ft 3in ahead of the leading driving axle. The driving wheels were all flanged. Adequate brake power was of vital importance in view of the nature of the route and the traffic to be worked, and no less than three brake cylinders were provided, with all wheels, including the leading pony truck, originally fitted with brakes.

The tender was based upon Deeley's standard design, with the addition of a smart tender cab which matched that of the engine in style. The reason for this was lack of suitable turntables, which meant that a good deal of tender-first running was inevitable. In view of this the SDJR token exchange apparatus for single-line working was fitted to both sides of the tender. Total weight in working order of the locomotives, as first delivered, was 108 tons 19 cwt 2 qtr, comprising a total engine weight of 64 tons 15 cwt and the tender weight of 44 tons 4 cwt 2 qtr.

The outside Walschaerts valve gear had most of the rods fluted, together with the coupling and connecting rods, and this basic valve motion arrangement was to be repeated on several later Fowler LMSR designs.

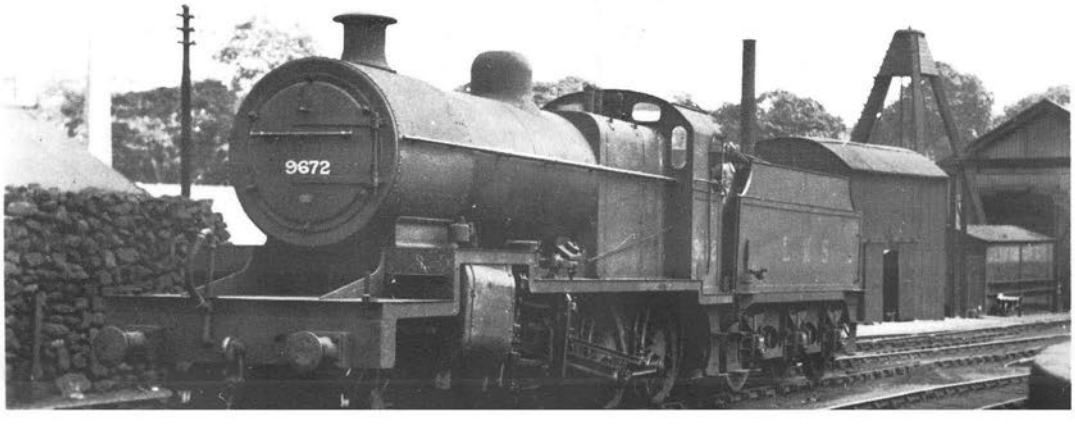
Experience in service led to a number of modifications to the original design, in

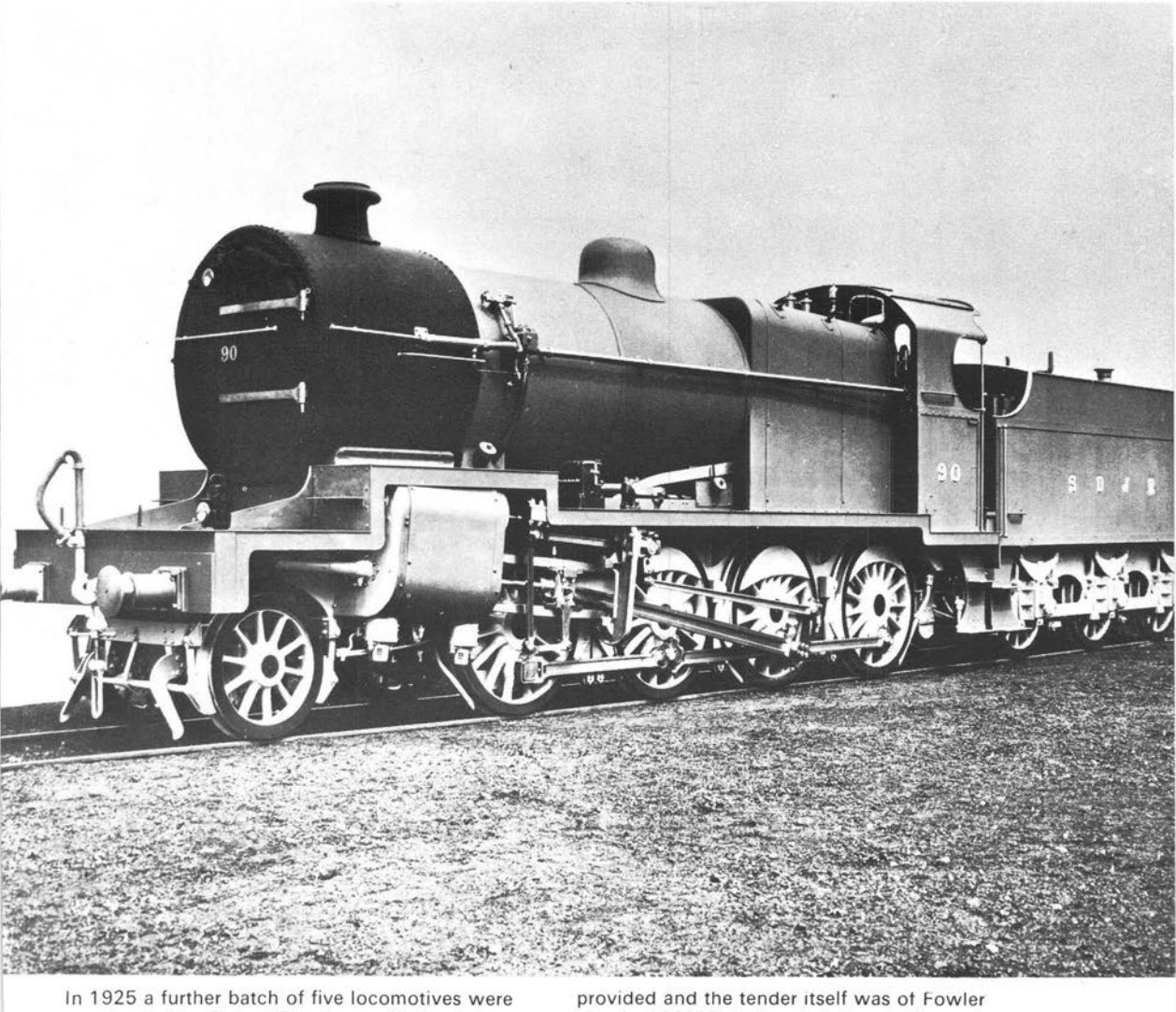
No. 85 on trial with a train of empties at Elstree on the Midland main line, 1918. There were reports of 'running-in' turns with these engines when new in 1914, but the trials with No. 85 were a deliberate assessment of the suitability of the design to replace the double-headed 0-6-0s, then standard practice on the coal trains to London. Unfortunately the MR loading gauge restricted the availability of the 2-8-0 and the fact that the SDJR design had the same undersized axleboxes as the 4F 0-6-0s led to overheating problems on the longer journeys. Mechanical lubricators were later added to feed the axleboxes of the 2-8-0s, in an attempt to improve performance.

*[Locomotive Publishing Co*

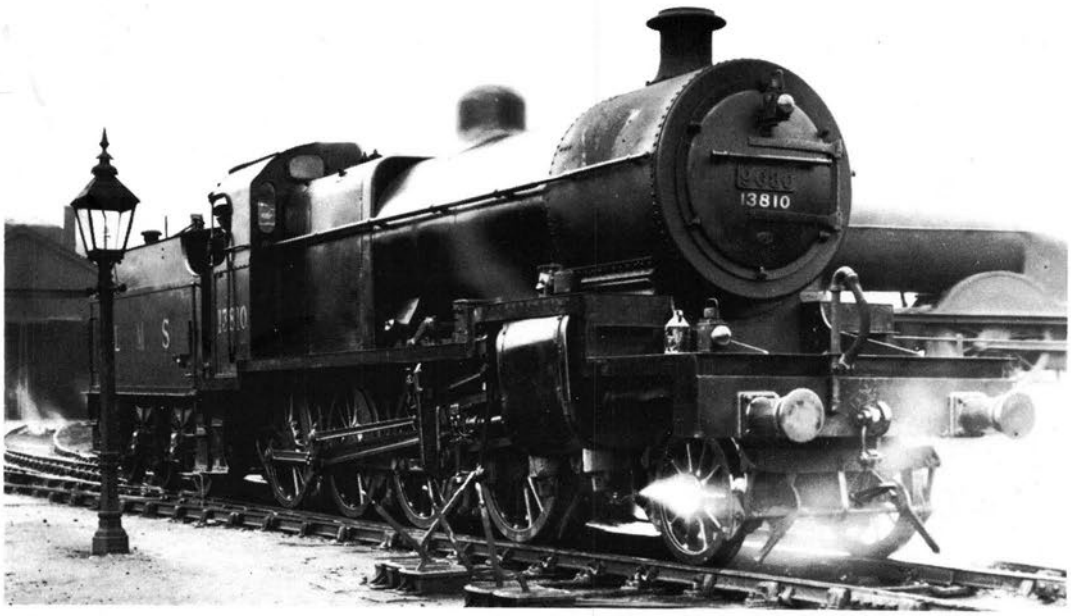
Very soon after delivery from Derby the lip was removed from the chimney top, the dome casing was slightly flattened and the cab top ventilator modified to a sliding type which did not project above. The reasons for this were that, due to weak bridges at Bath, the locomotives were not at first allowed to enter the sheds there. As a result they were allocated to Radstock shed, where it was discovered that they fouled the loading gauge by coming into contact with the roof ventilator within the shed. Other modifications included removal of the tender-cabs in 1919/20 following complaints of draughtiness from the enginemen. The cab roofs were later extended back over the tender to increase protection when operating 'tender-first'. This view of No. 82 was taken at Bath in 1930 when just renumbered 9672, following absorption of the SDJR locomotives into LMSR stock that year. The new number has been hand-painted on the smokebox door.

*[H. C. Casserley*






In 1925 a further batch of five locomotives were constructed by Robert Stephenson & Co. Ltd., Nos. 86-90. These differed from the earlier Derby-built locomotives principally in having a larger, non-standard, boiler designated G9BS., with increased evaporating and heating surfaces and Ross pop safety valves. The boiler centre line was the same height from rail level as on the previous small-boilered 2-8-0s, and this required a redesigned smokebox saddle and boiler mountings of reduced size. No tender cab was provided and the tender itself was of Fowler standard LMSR design. Left-hand drive and hand-operated screw-type reversing gear was fitted. No. 86 was exhibited at the Stockton and Darlington Railway centenary celebrations at Darlington when delivered new in 1925, and was given a special exhibition finish for this event. No. 90, the last of batch, is illustrated in works grey livery. Token apparatus not yet fitted to the tender side. *[British Rail*




Following a serious accident in 1929, when No. 89 ran-away with a freight entering Bath, this locomotive was repaired at Derby and returned fitted with a smaller standard G9AS boiler. The change involved inserting a distance piece to build up the smokebox saddle to accept the smaller boiler. In this view of No. 13810 (formerly LMSR 9680; SDJR 90) the alteration is plainly visible. This particular engine also received the smaller boiler *circa* 1929 following discovery of a defect in the firebox of the original large boiler. The smokebox still carries the numberplate 9680 of the 1930 LMSR renumbering: painted-out. The new number 13810 was adopted in 1932 when the class became Nos. 13800-10 to make way for the new Fowler 0-8-0 goods engines. Photographed at Bath in April, 1932, No. 13810 still retained the brakes on the leading pony truck, a feature removed by Stanier later in the 1930s.

*[H. C. Casserley*

particular to the sanding gear, which was originally steam-operated and was replaced by hand-operated gravity sanding.

In 1925 a further batch of five locomotives was constructed by Robert Stephenson & Co. Ltd., to meet a demand for additional heavy freight power on the line. Although following the same basic MR 1914 design, and incorporating the various modifications since made, the boiler was for some reason changed to a new and non-standard enlarged version known as the G9BS, with consequent increase in engine weight to 68 tons 11 cwt. Otherwise, it remained essentially a Midland Railway design, complete with weak, undersized, 4F 0-6-0 type axleboxes and short travel piston valves. Yet another change in sanding apparatus was made, with the provision of Lambert wet sanding, of French origin. Dimensional differences, compared to the 1914 batch, were a boiler diameter of 5ft 3in (instead of 4ft $9\frac{1}{8}$in); heating surface of 1 471 sq ft, comprising tubes: 1 323 sq ft and firebox: 148 sq ft. The superheater gave 374 sq ft. Weight in working order was a total of 111 tons 5 cwt; comprising an engine weight of 68 tons 11 cwt and a tender weight of 42 tons 14 cwt.

Stanier made a number of changes to the class, both the 1914 and 1925 batches, including removal of the pony truck brakes, and replacement of the original Fowler-Anderson by-pass valves by his standard relief valves. New Stanier chimneys replaced the Fowler version. The diameter of the coupled wheels was increased by 1in, to 4ft $8\frac{1}{2}$in, by provision of new tyres; thereby

reducing the nominal tractive effort to 35 296 lb. Later changes included yet another modification to the sanding gear, which became steam-operated for all the class, and the provision of double-handled regulators and standard LMSR sliding fire-box doors.

The intermittent use of the 2-8-0s on passenger trains seems to have commenced shortly after delivery of the 1925 batch, but it was not until after the end of World War 2 that shortage of motive power led to their regular use on such duties, including double-heading on summer weekends. Although trials had taken place on the Midland main line in 1918 with No. 83, and again in 1926-27, when No. 88 was pitted first against two ex-LNWR 0-8-0s and later against two ex-MR 0-6-0s, the class remained indelibly associated with the SDJR line throughout their lives. In 1931 several of the class were again loaned to the Midland Division and worked on coal trains, but in Fowler's time no suitable 2-8-0 design was ever finalised and produced for the Midland Division coal traffic, and it was left to Stanier to find a more versatile solution than the big Beyer-Garratts (see page 69 ) which eventually ousted the pairs of 0-6-0s from these turns.

Scrapping of the 1914 batch took place between 1959 and 1962, and the first of the 1925 batch went at the end of 1963. Happily, No. 53808 was rescued from the private scrap-merchant's yard and a fund for purchase and restoration was established by the Somerset and Dorset Circle, a group of enthusiasts, who have now housed the locomotive at Radstock, where it was undergoing thorough restoration at the time of writing.

The engines were built as follows:

| | | |
|---|---|---|
| SDJR Nos 80-85 | Derby | 1915 |
| SDJR Nos 86-90 | Robert Stephenson | 1925 |

Reboilering of the 1925 series was halted after Nos. 89/90 had been treated, as this provided spares to keep the others going. However, in 1953 reboilering was commenced again with No. 53808 (SDJR 88) and the last locomotive to carry a large G9BS boiler was No. 53806, rebuilt in 1955. Seen here in March of that year, No. 53806 is climbing through Lyncombe Vale, Bath with the 11.20 am down goods; with obvious banking assistance at the rear of the train.

*[Ivo Peters*

*Left:* Crisp frosty morning sunlight emphasises the bold outline of No. 53801, passing through Chilcompton with the 8.55 am goods from Bath, on November 23, 1957. Withdrawal of the 1914 series commenced in 1959 with No. 53800, and ended in 1962 with the withdrawal of Nos. 53803/4. *[Ivo Peters*

*Below:* Making heavy weather with a Bath-Midsomer Norton empties, No. 53810 blasts up Devonshire Bank out of Bath, in July 1963. This view illustrates the interesting fact that the 1925-built series retained the raised version of the cab-roof ventilator, but within the SDJR loading gauge. *[Derek Cross*

The class was renumbered LMSR Nos 9670-80 in 1930, and again, LMSR Nos 13800-10 in 1932; becoming BR Nos 53800-10 in 1948. The livery of the class was always plain black, only the numerals and insignia varied in style.

**First of class withdrawn:** 53800 (1959)
**Last of class withdrawn:** 53807 (1964)
**Example preserved:** 53808

When No. 53807 was reboilered in 1954 the smokebox saddle was in such poor condition that a new one to the original 1914 pattern was provided. Boilers from scrapped compound 4-4-0s were sometimes used as replacements on the 2-8-0s in later days. This view of 53807, complete with Stanier chimney and small boiler, was taken at Midsomer Norton in June 1964 during the final months of operation by the 1925-built series. The locomotive is double-heading 4F 0-6-0 No. 44558, (one of the original SDJR series of five 0-6-0 locomotives supplied by the Midland Railway in 1922), on a Bath-Templecombe train. *[Derek Cross*

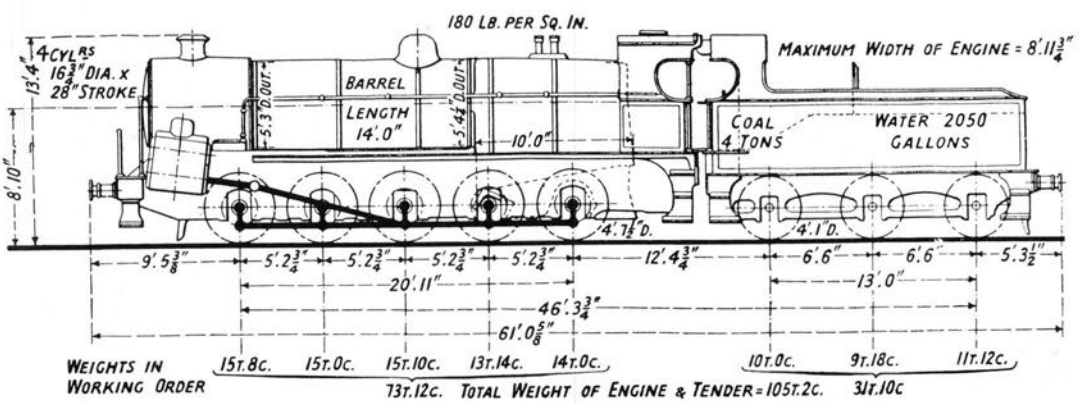
## Section: 3 0-10-0
## Lickey Banking Engine
Introduced: 1919 Total: 1

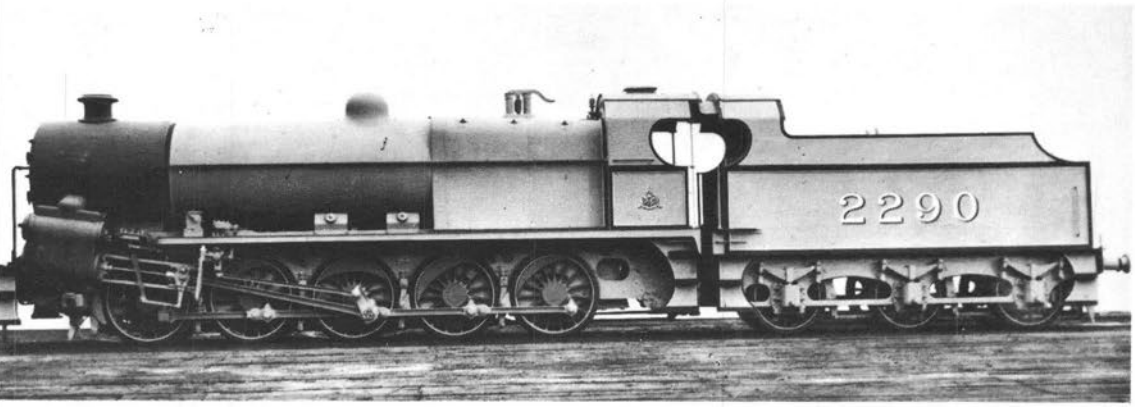
The two mile 1 in 37½ Lickey incline between Bromsgrove and Blackwell on the Midland Railway line from Birmingham to Bristol necessitated provision of a stud of banking engines. Often two or three such engines were required to bank a single heavy train; an expensive operation. The desirability of a special powerful banking engine for these duties must have been fairly obvious to all concerned, and proposals were put forward *circa* 1911 for the design and construction of just such an engine.

In his recent book *Derby Works and Midland Locomotives*, J. B. Radford reveals that between 1911-12 Derby drawing office put forward a number of very interesting proposals, including a 2-10-0 tank locomotive; an articulated 2-6-6-2 tank locomotive; a rigid framed 0-6-6-0 tank locomotive, and finally in 1912 the 0-10-0 'Decapod' tender engine. The Great Eastern Railway had constructed the first English 0-10-0, a tank locomotive, in 1903, but the Midland design was the first and last 0-10-0 tender locomotive ever built for use in this country. It was, of course, easily the largest locomotive designed and constructed by the MR; followed in size by the SDJR 2-8-0s described on page 24.

The order was placed for construction of one engine, at Derby in May 1914, but owing to the disruptive effects of World War 1 the engine was not completed until the end of December 1919. It was an impressive product for a railway sworn to a 'small engine' policy. With four cylinders, outside Walschaerts valve gear and a coupled wheelbase of 20ft 11in, it was powerful looking, to say the least!

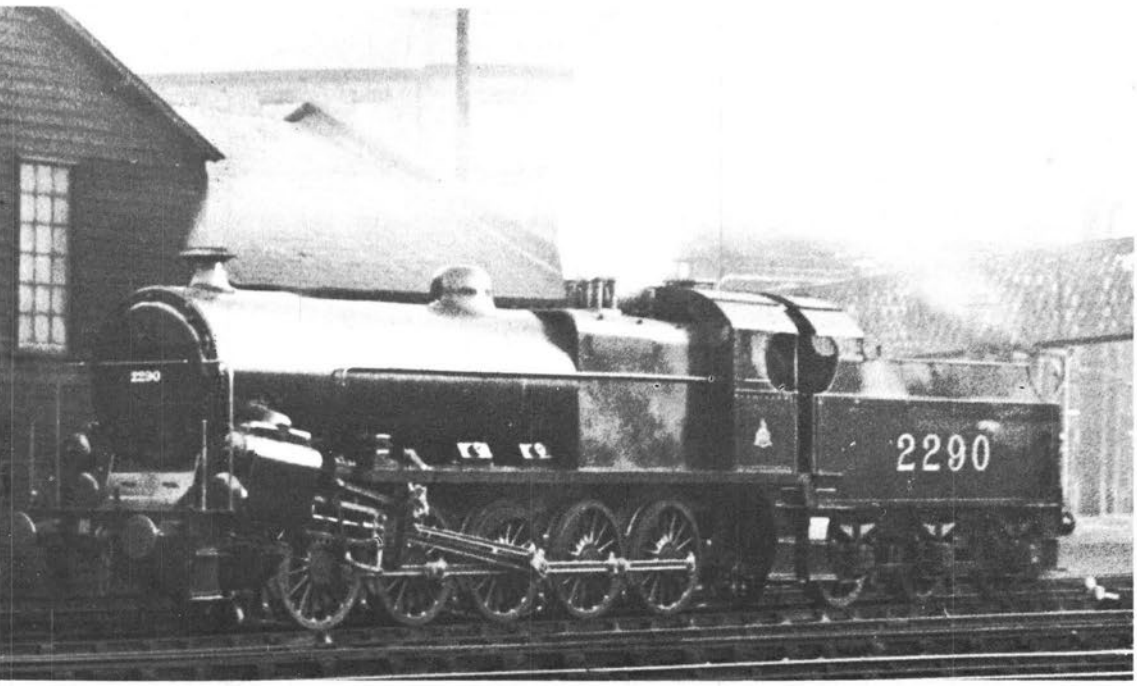
The four cylinders were 16¾in diameter by 28in stroke and all drove on to the centre pair of wheels (which carried an axleload of 15½ tons). Two outside sets of Walschaerts valve gear drove a pair of 10in diameter piston valves, with ⅞in lap, mounted one on top of each outside cylinder.






Official broadside photograph in workshop grey livery, taken 1919. The locomotive, which was nicknamed 'Big Bertha', was actually delivered to traffic in plain glossy black livery, without lining-out. The bufferbeam carried the initials MR, and the company coat-of-arms was on the cabside. The builders' plate was somewhat oddly located on the side of the main frames, below the running plate and between the third and fourth coupled wheels. This shows the original height of the tender sides, later reduced to give better rearward vision.

*[British Rail LM Region*




With a good head of steam showing from her two sets of Ramsbottom safety valves, 'Big Bertha' makes her first trial trip at Derby on January 1, 1920 just two days after completion. No headlight was fitted to the locomotive when new, and the addition of one about a year later was presumably because enginemen experienced some difficulty in estimating the length of the locomotive when 'buffering-up' to the rear of a train in the hours of darkness. No. 2290 ran with oil-burning apparatus for a while in 1921.

*Above:* 'Big Bertha' demonstrates the effectiveness of the powerful electric headlight fitted to the engine in 1921. When the engine was finally withdrawn in 1956 the headlight was transferred to the BR standard 2-10-0 No. 92079 which was to be her replacement on the Lickey incline.
*[British Rail*

*Left:* Close-up of the cab of 'Big Bertha', with Midland Railway coat-of-arms on the cabside. The running-plate was carried high to clear the driving wheels and necessitated three steps to reach the footplate from rail level. The tender cab of No. 2290 was basically the same as that provided for the SDJR 2-8-0s. Below the running plate and just in front of the footsteps can clearly be seen the British Thompson & Houston Co. Ltd. steam turbo-generator fitted in 1921, to supply the powerful headlight. This locomotive carried no cabside power classification; presumably being regarded as too specialised to warrant inclusion in the scheme. *[British Rail*

These cylinders were inclined at 1 in 7. The five pairs of 4ft 7½in diameter driving wheels were equally spaced. The outside valves also fed the inside cylinders via crossed ports. A special G10S type superheated boiler was designed for the engine (a spare similar boiler was supplied in 1922 and thereafter alternated for repairs), with a total heating surface of 1 618.25 sq ft, comprising: large and small tubes, 1 560 sq ft and firebox: 158.25 sq ft. The superheater gave 445 sq ft. Boiler pressure was set at 180 lb per sq in, with four Ramsbottom safety valves (later replaced by Ross pop type). A six-wheeled tender was fitted, with 4 tons coal, 2 050 gallons water capacity. This had a cab fitted, very similar to that on the tenders of the 1914 batch of SDJR 2-8-0s (see page 24 ) and weighed 31 tons 11 cwt 2 qtr in working order. With an engine weight of 73 tons 13 cwt 1.6 qtr this brought the total weight of the locomotive in working order to 105 tons 4 cwt 3.6 qtr.

The engine was built as follows:

| | | |
|---|---|---|
| No 2290 | Derby | 1919 |

Renumbered 22290 by the LMSR in 1947, and again renumbered, 58100 by BR the following year.

**Withdrawn:** 1956

Judging from the clean lined-black BR livery, No. 58100 was not long out of shops when this photograph was taken. When the locomotive was inoperative for any reason her turns were usually rostered to a pair of class 3F 0-6-0Ts. No vacuum brake was fitted to 'Big Bertha'. Unlike the SDJR 2-8-0s which had the tender-cabs removed following complaints of draughtiness by the crews, No. 58100 retained this feature throughout her 36 years in service. *[P. Ransome-Wallis*

Nearing the end of her career, and looking externally somewhat neglected No. 58100 nevertheless still presents an imposing and powerful looking front end to the camera. The huge inclined four-cylinder arrangement was saved from the scrapper's torch and has been preserved by the Curator of Historical Relics, British Railways Board. The locomotive is seen coasting down the incline on August 31, 1955. When finally withdrawn the following May, the engine had a total mileage of 838,856 to her credit, the vast majority of it accumulated over the 2 mile stretch of the Lickey incline! *[T. J. Edgington*

Withdrawn from service in May 1956, 'Big Bertha' was still intact at Derby when this photograph was taken the following September. In fact a start had been made in dismantling, but the loco was patched-up for display at Derby Works open day in August. The headlight was removed, together with the steam turbo-generator, but otherwise the engine was visually intact and there was some talk of possible preservation at this time. *[P. H. Groom*

## Section: 4 4-4-0 Class 4; later 4P Express Passenger Engines

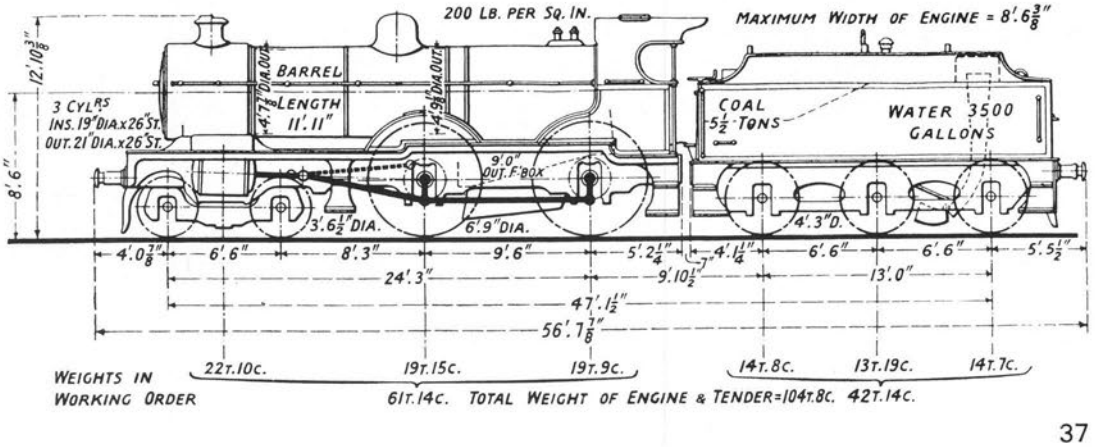
Introduced: 1924 Total: 195
Compound Type

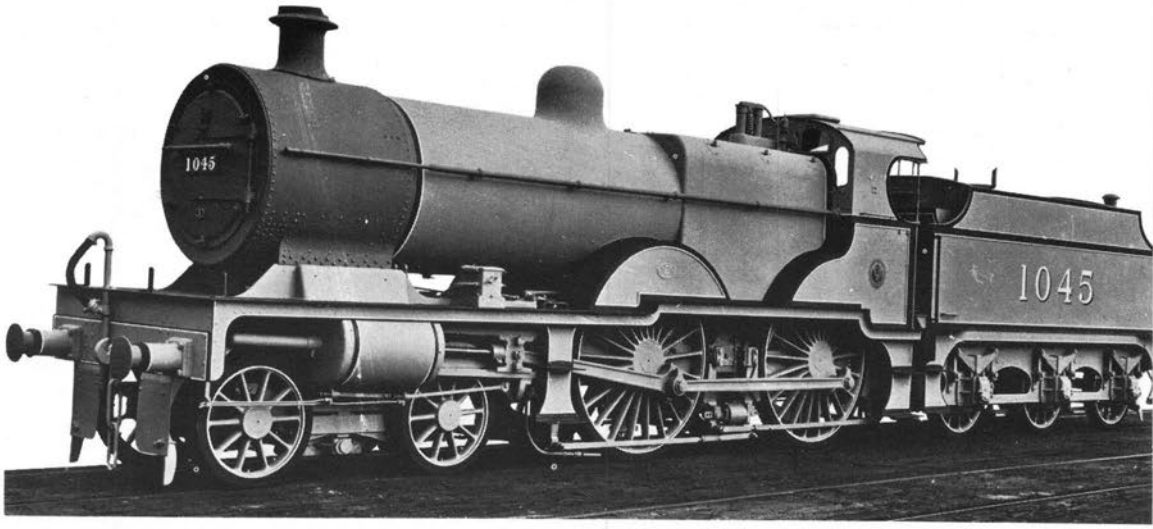
The Midland Railway passed into LMSR ownership on January 1, 1923 with a top link stud of express passenger engines consisting solely of 4-4-0s; the 10 class 999 simples and the 45 Compounds. The newest of the Compounds was fourteen years old, and half the class still had non-superheated boilers. The original Johnson-Smith design, improved by Deeley and modified by Fowler, represented probably the most successful application of compounding to a British locomotive type, and the Midland engines had a reputation for fast-running with the lightly loaded expresses of the day.

A strong Midland bias existed in the new LMSR management, particularly on the Operating side; men imbued with the 'small engine-light load' policy of MR days, and to them, the construction of new batches of the successful Compound 4-4-0s for use elsewhere on the LMSR system, must have seemed a logical enough step. To demonstrate the true worth of the design, in December 1923 and January 1924, Compound No. 1008 (in ex-works condition) was matched against a well run-in ex LNWR Prince of Wales class 4-6-0 and an ex MR 999 class simple 4-4-0, on Dynamometer Car trials over the steeply graded MR Settle to Carlisle main line. The Compound came out of this head-and-shoulders above the other two, having hauled considerably heavier than usual loads in the process.

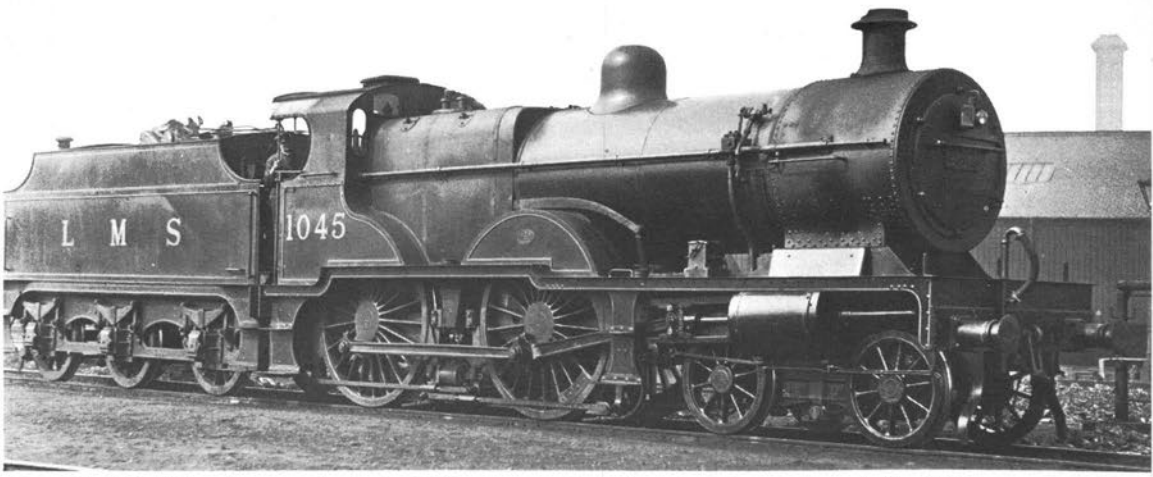
It would seem that someone at Derby had already made up their minds about the engines however, because as early as June 1923 an order had been placed for 20 new superheated Compounds, similar to the MR engines except for a reduction in driving wheel diameter from 7ft 0in to 6ft 9in, and an increase in the diameter of the low and high pressure cylinders of $\frac{3}{4}$in. This initial batch had right-hand drive and Ramsbottom and lock-up safety valves.

Whilst these 20 engines were under construction, one of the earlier MR Compounds,






4P Compound 4-4-0 No. 1045, the first of the LMSR Fowler series, with coupled wheels 3in smaller than the MR engines and both high and low pressure cylinders $\frac{3}{4}$in larger. No. 1045 (first of a batch of 20 ordered from Derby) appeared in February 1924. The first of the series is shown here in works grey livery, in original condition, with Ramsbottom and lock-up safety valves; tall chimney; right-hand drive and Deeley tender. Below the bufferbeam are the two splash-plates ahead of the leading bogie wheels, a MR practice intended to protect the lubrication of the bogie's wheels when double-heading was common practice. Water splashed up from the tender of the leading engine when passing over troughs was liable to find its way into the bearings of the train engine's bogie. *[British Rail LM Region*

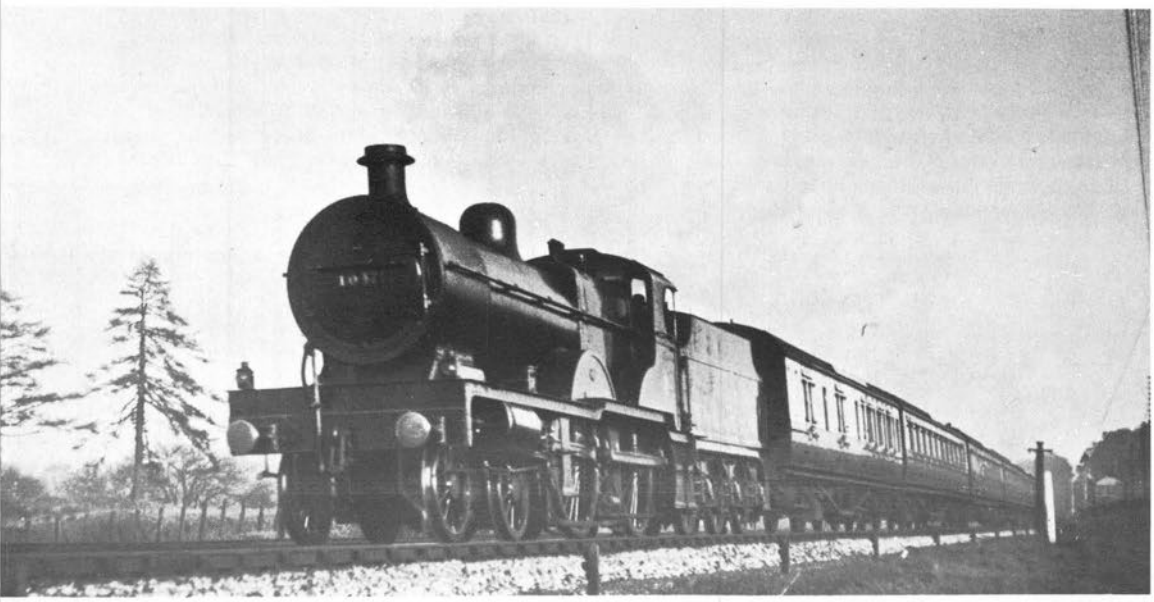



First of the LMSR batch as running in the 1930s. The Ramsbottom and lock-up safety valves have been replaced by Ross pop valves, and the bogie splash plates have been removed. No. 1045 was photographed in the carriage sidings at Nottingham. *[T. G. Hepburn*

No. 1033, was running trials on the Euston to Wolverhampton expresses. A second batch of Compounds followed-on immediately, this time with Ross pop safety valves. These engines retained the right hand drive, but had shorter chimneys to clear the Scottish loading gauge. As this second batch (Nos 1065-1084) was nearing completion, further trials were held between Leeds and Carlisle in November and December 1924 and February 1925, using Nos 1065/66 (first two of the second new batch, with 6ft 9in wheels) plus No. 1023 of the original MR 7ft series, against an ex LNWR Claughton 4-6-0 and an ex Caledonian Railway Pickersgill 4-4-0. In May 1925, Compound No. 1065 ran trials against a class 2 4-4-0 on the SDJR Bath to Bournemouth line, and in the same month it also ran on the ex LNWR Preston to Carlisle line, in this latter case against a Prince of Wales, a Claughton and a modified Hughes LYR 4-6-0. The outcome of all these trials was that the Compounds were regarded as giving the best and most economical all-round performance, and they were accordingly selected for future standard construction.

In fact, whilst the trials went on, a further batch of 30 was under way; these incorporated certain modifications, in particular, reversion to the original smaller diameter of the low and high pressure cylinders (21in and 19in diameter respectively). The 6ft 9in diameter driving wheels were retained, but the engines were arranged for left-hand drive, which became standard on the LMSR. The earlier LMSR-built Compounds had their cylinder diameters reduced in 1925/26, but retained the right hand drive. Large

One side effect of the strange affair of the Royal Scots' inception (see Section 8 page 77) was the loan of 4P Compound 4-4-0 No. 1047 to the Great Western Railway in September, 1926, in exchange for 'Castle' class 4-6-0 No. 5000 *Launceston Castle,* which ran trials on the LMSR to determine what type of new express passenger was required. The Compound did not run trials on the GWR, being used on normal revenue earning runs on the Paddington-Birmingham and Plymouth services. No. 1047 (presumably chosen in preference to a newer locomotive because of the right-hand drive; standard on the GWR) was based at Bristol, in the charge of a driver from Kentish Town. The locomotive is seen here hauling the 1.15 pm down Paddington to Bristol express, passing Sonning Box. *[D. L. Rumble*

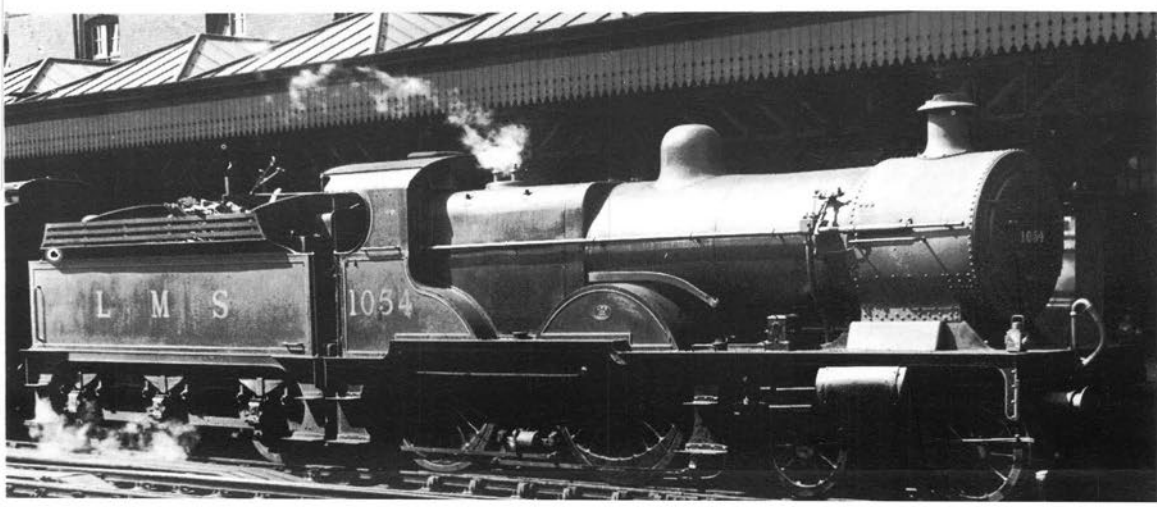


The 1926 coal strike badly affected supplies of suitable coal, and threatened to exhaust the large reserve stocks. In an attempt to prevent the possibility of a complete collapse of rail services the LMSR authorised oil-burning apparatus for application to selected locomotives. Two tanks (some rectangular; some cylindrical) were mounted in the tender coal space. No. 1059 was photographed at St. Pancras on the 4.15 pm to Leeds and Bradford, fitted for oil-burning.

*[F. R. Hebron*

One of the highlights in the story of the LMSR Compounds was undoubtedly the non-stop Euston-Edinburgh run of Friday, April 27, 1928 which, together with a non-stop Euston-Glasgow run the same day (see page 80) stole the limelight from the rival LNER route where the non-stop 'Flying Scotsman' had been well publicised to commence the following Monday! The 'Royal Scot' was divided into two portions for this occasion. The Edinburgh portion was entrusted to No. 1054 and a three man volunteer crew. To provide adequate coal capacity three Deeley MR long wheelbase tenders were taken from 4-4-0s and modified to carry 9 tons coal by fitted overhanging coal rails. No. 1054 received tender No. 2751 (off a 3P 4-4-0) and No. 6113, the 'Royal Scot' class 4-6-0 which worked the Glasgow portion, received one of the other two tenders. These were tender Nos. 2805/8 (off '999' series 4-4-0s) and they were afterwards attached to Compound 4-4-0s Nos. 1061 and 1057 respectively. No. 1054 is illustrated, at Nottingham Midland station. The locomotive had right-hand drive and the tall Fowler chimney of the 1045-1064 batch.

*[T. G. Hepburn*



From No. 1065 onwards the LMSR Compounds had shorter chimneys to allow operation on the Northern Division (Scotland) where the loading gauge was more restricted. Ross pop valves were fitted from new, and commencing with No. 1085 (first of the 1925 batch) the cylinder dimensions reverted to the MR sizes of 19in and 21in diameter for high and low pressure respectively. Also commencing with No. 1085 the drive was changed to the left-hand side. A consequence of the early LMSR livery practice, which placed the locomotive number on the tender, was the confusion created when a tender exchange took place. Hence such instances as shown here, where No. 1108 is paired with the tender off No. 1102. In the background is the short-lived Beyer-Ljungström turbine locomotive which ran trials on the Midland line in 1926. *[T. G. Hepburn*

scale construction of Compounds was embarked upon at this stage, and the engines were allocated to all Divisions of the LMSR; of which more anon.

The type G9AS boilers of the LMSR Compounds were completely interchangeable with the original Midland engines and also with the 1914 batch of SDJR 2-8-0s. The large and small tubes provided 1 169.7 sq ft of heating surface, the firebox provided 147.3 sq ft and the superheater 290.7 sq ft. The boiler pressure was 200 lb sq in, and the tractive effort at 85 per cent boiler pressure was 22 649 lb at the rims of the 6ft 9in driving wheels. The weight of the engine in working order was 61 tons 14 cwt and the standard Fowler tender (when fitted) weighed 42 tons 14 cwt, giving a total locomotive weight of 104 tons 8 cwt in working order. The single high-pressure cylinder was of 19in diameter by 26in stroke, the two low pressure cylinders were 21in diameter by 26in stroke. (It should be recalled that the diameters were at first $\frac{3}{4}$in larger.)

The engines were built as follows:

| | | |
|---|---|---|
| Nos 1045-1084 | Derby | 1924 |
| Nos 1085-1114 | Derby | 1925 |
| Nos 1115-1130 | Horwich | 1925 |
| Nos 1131-1134 | Horwich | 1926 |
| Nos 1135-1159 | North British | 1925 |
| Nos 1160-1184 | Vulcan Foundry | 1925 |
| Nos 1185-1199 | Vulcan Foundry | 1927 |
| Nos 900-909 | Vulcan Foundry | 1927 |
| Nos 910-924 | Vulcan Foundry | 1927 |
| Nos 925-934 | Vulcan Foundry | 1927 |
| Nos 935-939 | Derby | 1932 |

These numbers had 40000 added in 1948, by BR.

Stanier arrived on the scene in 1932 and

A Westinghouse air-brake was fitted to No. 934 during 1930/1, for special workings. The air reservoir was carried on the leading end of the tender on the fireman's side. This locomotive, as BR No. 40934, was probably the last to carry Crimson Lake LMSR livery, up until late 1951, having survived the 1939-45 war period without repainting. *[T. G. Hepburn*

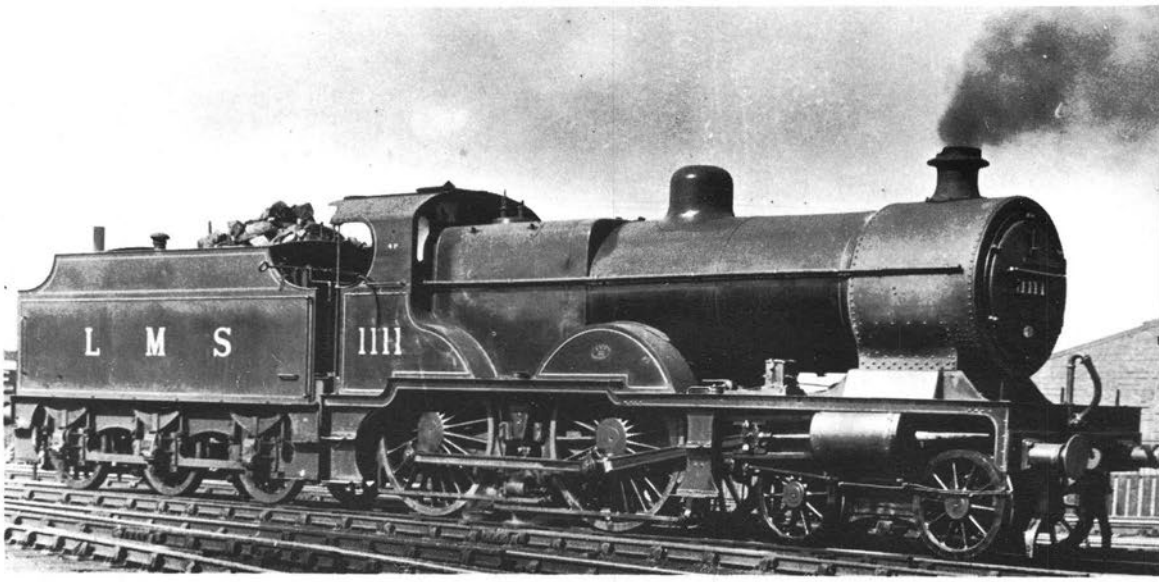
with Nos 935-939 the orders for new Compounds ceased. These final engines had a rougher finish, with liberal use of snap head rivets, and had Stanier chimneys.

When new, the Compounds were received with mixed feelings in some areas, as they were 'foreign' machines and required a totally different driving technique if the full value of compound working was to be gained. In particular, the ex LNWR men, long accustomed to a tradition of hard driving, did not take kindly to the Midland product. However the Compounds did their share of hard work on most parts of the LMSR system, and once the drivers got the 'feel' of them their objections largely subsided, and the engines settled down to give some excellent running. One drawback of compounding, proven by tests, was that once taken off top link duties and driven by inexperienced men, the efficiency of the Compounds deteriorated at a far greater rate than would be the case with an equivalent simple expansion engine.

The LMSR was the only one of the Big Four main line companies to continue to design and build compound-type locomotives, and the 4-4-0s were the last representatives of compounding to run in Britain. One can only speculate upon what developments might have taken place if Sir Henry Fowler's proposed compound 4-6-2 and 2-8-2 designs (discussed in the introductory pages) had come to fruition.

**First of class withdrawn:** 41171 (1952)
**Last of class withdrawn:** 41168 (1961)
**Examples preserved:** Nil
(No 1000 of the original MR class is officially preserved in 1914 rebuilt condition.)

Another tender variation was No. 3677, a standard Fowler 3 500 gallon tender (originally attached to a 4F 0-6-0) which was rebuilt with high curved sides in 1933. It ran attached to Compound No. 936 until 1954, carrying first LMSR Crimson Lake, then unlined wartime black and finally BR mixed-traffic lined liveries, in the course of time. it would seem that this tender was an experimental prototype for the Stanier high curved side design. No. 936 is seen at Derby in Crimson Lake livery, with the tender lining-out and lettering modified to allow for the panelling. The 935-9 series were delivered new with exhaust steam injectors, and a number of other Compounds were later modified. *[T. G. Hepburn*




An interesting comparison between two stages in the career of a single locomotive. No. 1111 is seen here in pre-war LMSR days, at Longsight shed. In Crimson Lake livery, and very much in original condition, with short Fowler chimney, fluted side rods and standard Fowler tender, without coal rails. *[T. G. Hepburn*

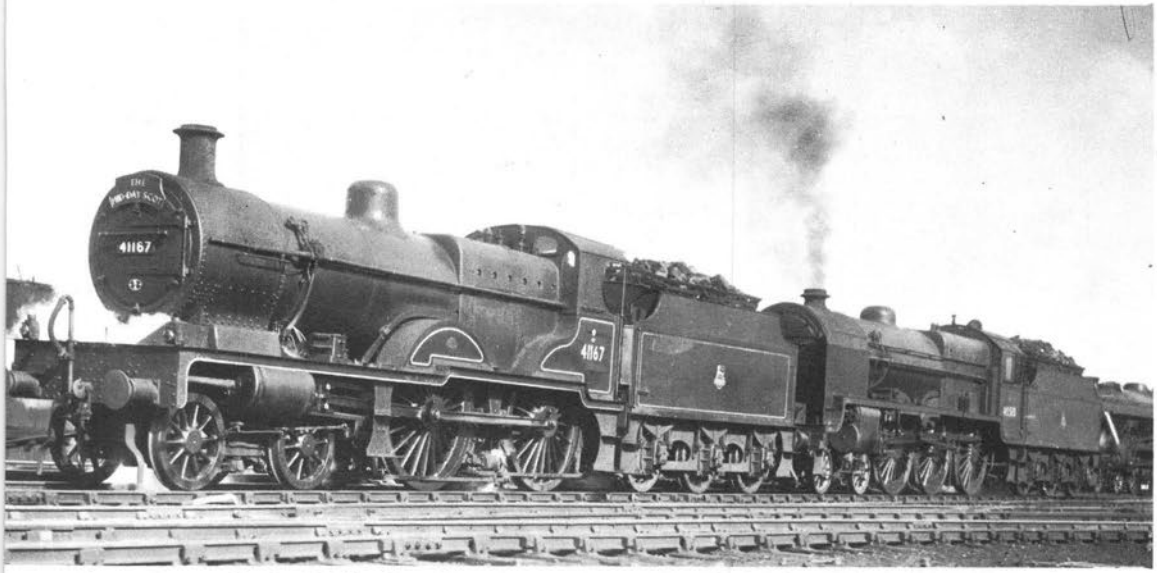
The same locomotive, photographed at Derby in 1952, as BR No. 41111, in lined black mixed-traffic livery. A tall version of the Stanier chimney has been fitted; the side rods are of plain rectangular section and the tender has been exchanged for a 'hybrid' Deeley tender in which the shorter Fowler tank is mounted upon the long wheelbase Deeley chassis. This particular tender rebuild dates from the 1939-45 war period and has no beading, giving an appearance somewhat like the SR Maunsell tenders. The locomotive front-end has been modified with strengthened and enlarged frames similar to the 935-9 series. *[R. J. Buckley*

Compound in its heyday. In sparkling condition No. 1095 working hard with the up 'Thames-Forth' express near Edwalton. The tender is very heavily coaled, because the return working for this locomotive was the night St. Pancras-Edinburgh, which it was booked to haul as far as Nottingham. *[T. G. Hepburn*

Familiar nickname for the LMSR Compounds in pre-war days was 'Crimson Ramblers', due to their livery and extensive allocation to various parts of the LMSR system. The 1939-45 war put an end to the application of Crimson Lake livery (although a few examples survived until early BR days) and plain black was their final LMSR livery.

Nevertheless, No. 1118 makes a brave sight as she rounds the curve between Deganwy and Llandudno with the 4.15 p.m. Liverpool to Llandudno express in June 1948. The engine has acquired a Stanier chimney; strengthened front end frames and coal rails on the Fowler tender. *[E. D. Bruton*

The spectacle of a Derby design carrying former LNWR livery was not lost upon the supporters of Crewe! In the lined-black BR mixed-traffic scheme, Compound No. 41061 is seen approaching Elstree on the up (Saturdays only) 1.07 pm Bradford to St. Pancras express in October 1952. By this time the class was in general decline, and only infrequently to be seen on such an important working. *[E. D. Bruton*




Unusual power for the 'Midday Scot' Compound 4-4-0 No. 41167 and 'Patriot' 4-6-0 No. 45513 waiting to take over the train, at Crewe in September 1954, presumably due to non-availability of the Pacific normally rostered to the express. The Compound has a tall Stanier chimney and carries a blue circle painted above the number and power classification on the cabside, to denote prohibition from the former Northern Division lines of the LMSR, due to loading gauge restrictions.

*[W. H. Whitworth*

Somewhat untypical duty for a Compound. No. 40938 heads coal empties out of Perth, on the Aberdeen line, in September 1953. The batch of Compounds built at Derby in 1932, Nos. 935-9, had snap head rivets used in their construction instead of the smoothly finished counter-sunk type.

*[W. J. V. Anderson*

In June 1959, No. 41101 of Lancaster was fitted with the chime whistle from a BR 'Clan' 4-6-2 and sent to Newton Heath shed, where it was used during July on excursions and reliefs. As an advertising 'gimmick' for the *Daily Mirror* newspaper, it was repainted, later that month, in red and yellow livery at Gorton works, and used to haul a special 'Andy Capp' excursion train the following month; after which it was quickly withdrawn for scrap! No. 41101 is seen here at Newton Heath shed, July 31st, 1959.

*[J. E. Wilkinson*

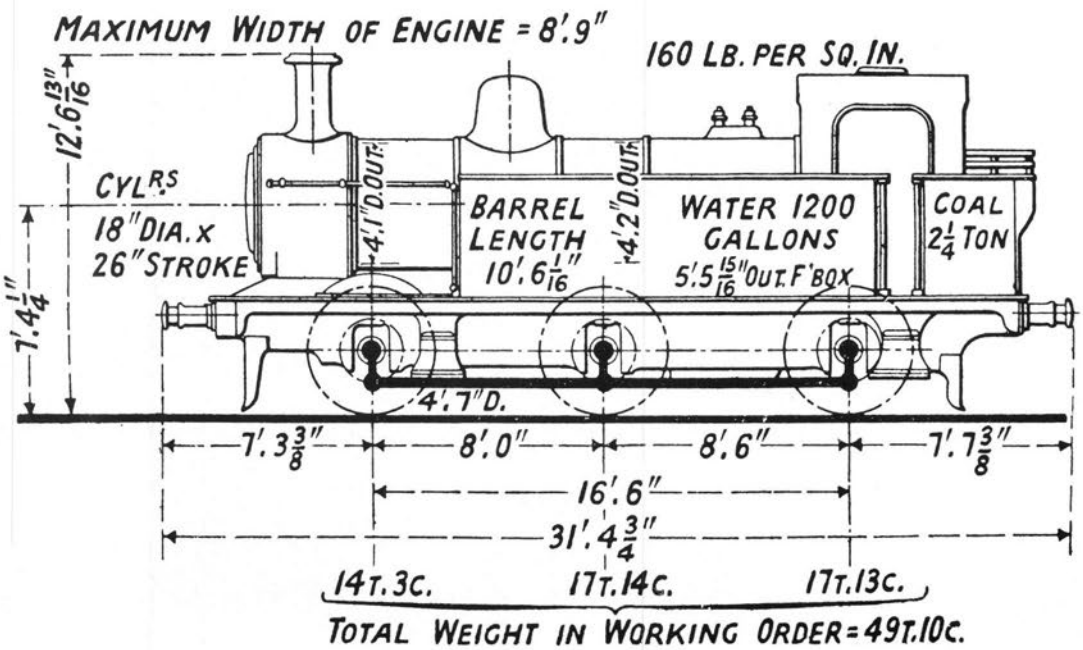
## Section: 5 0-6-0T Class 3; later 3F Shunting Engines

Introduced: 1924 Total: 422

The standard LMSR shunting tank engine design was based directly upon the Johnson MR 0-6-0T design of 1899, as rebuilt by Fowler with Belpaire boiler and improved cab. The Johnson design was in fact an enlarged version of his earlier 0-6-0T design of 1874/8, therefore the LMSR locomotives may be described as the direct descendants of a design first introduced nearly half-a-century earlier. George Hughes was CME of the LMSR when the decision was taken to standardise the MR design, and apart from a general clean-up of the details such as elimination of splasher beading, extension of the top half of the bunker rearwards and extension of the smokebox forwards, it was essentially the 1899 design, as improved by Fowler.

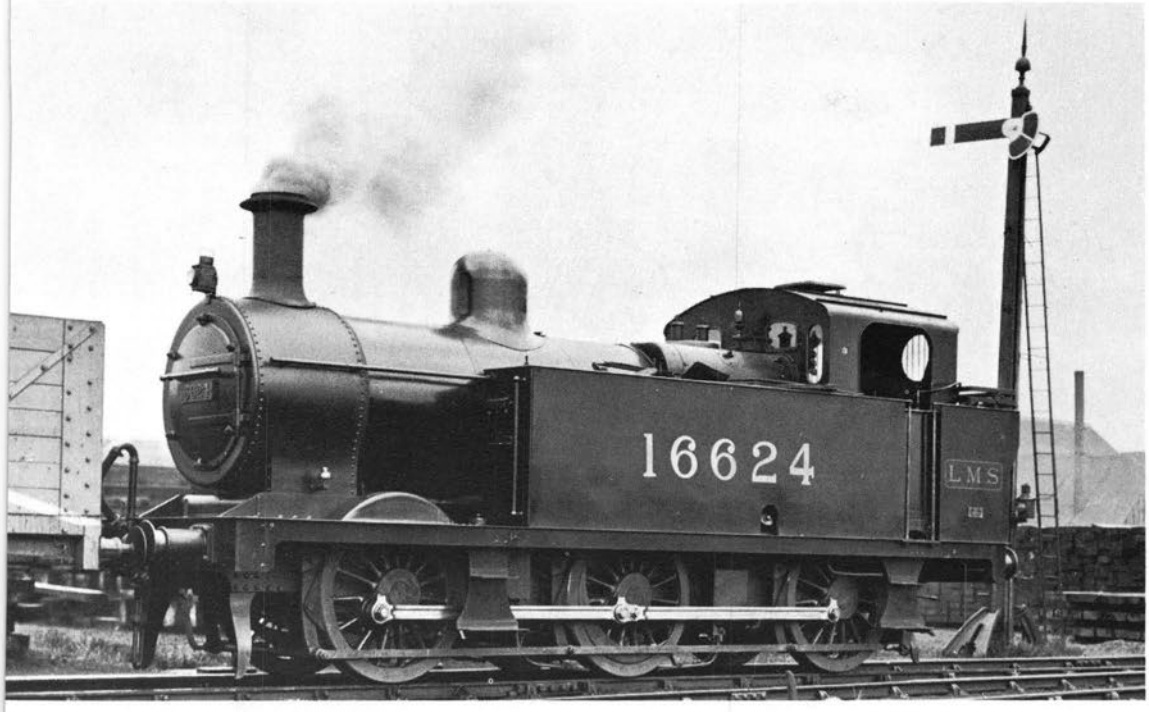
The design was simple and straightforward, with a non-superheated Belpaire boiler of type G5½, and inside cylinders. The boilers varied slightly; some had 194 tubes giving a heating surface of 967 sq ft, some had 196 tubes and a heating surface of 1 074 sq ft. The firebox heating surface was 97 sq ft. The first 50 LMSR engines had Ramsbottom safety valves, later batches had Ross pop valves and the early locos were modified to bring them into line.

The two 18in diameter by 26in stroke



3F 0-6-0T No. 7100 (renumbered 7260 in 1934) the first of a batch of 50 locomotives built during the Hughes regime on the LMSR. Ramsbottom safety valves and rear sandbox filler located on top of side tank. The Ramsbottom valves were later replaced by Ross pop valves. No. 7100, built by the Vulcan Foundry in 1924, was photographed in early LMSR black livery, with the initials on a red panel on the bunker sides. The lubrication oil cup on the smokebox side was later removed.

*[British Rail LM Region*

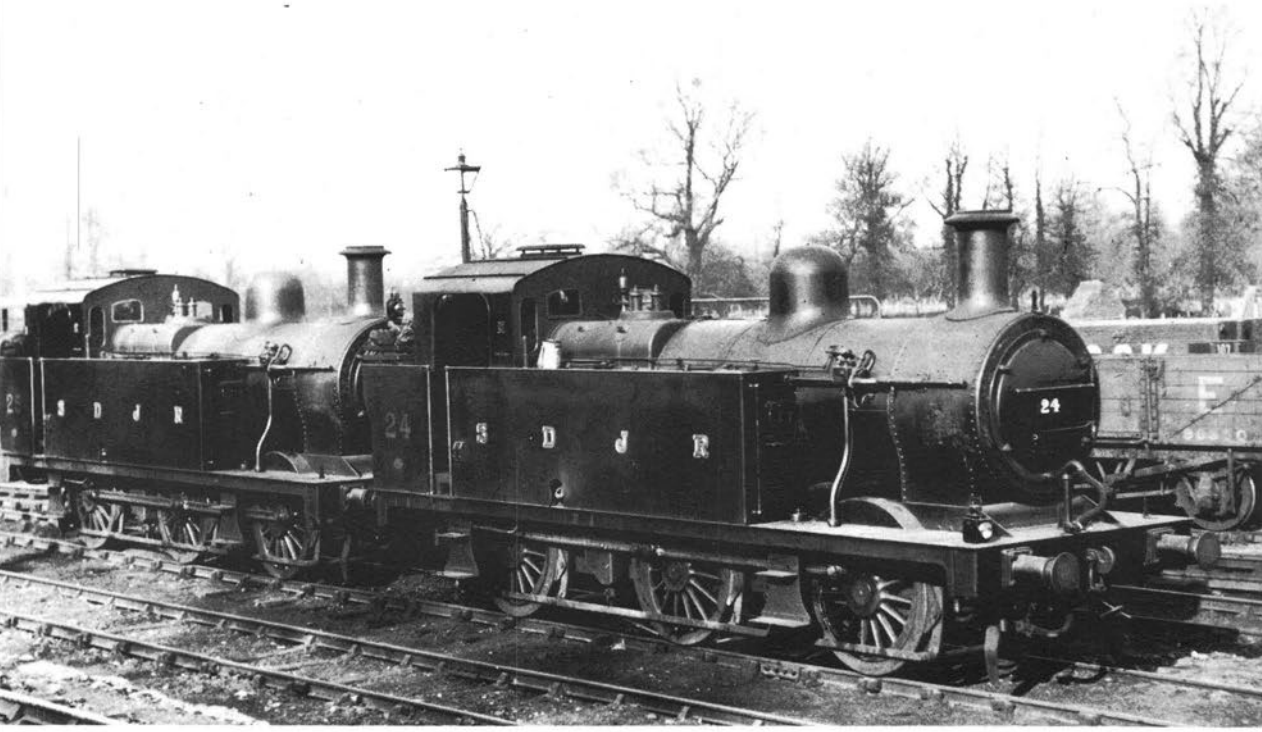



No. 16624, last of a batch built by Beardmore in 1928, and typical of the majority of the class from No. 16400 onwards, as first delivered; with Ross pop safety valves and rear sandbox filler relocated at base of side tank. No. 16624 became No. 7541 in the 1934 renumbering scheme. Photographed when new, at Forres in May 1928.

*[H. C. Casserley*

The 3F 0-6-0Ts were used to replace the elderly NLR 4-4-0Ts on the Broad Street-Potters Bar service, in the late 1920s. No. 16582 (later No. 7499) is seen approaching Potters Bar on this working. The engines carried destination boards as a rule—this being an exception! The steam-heating hose has been removed for the summer period.

*[F. R. Hebron*

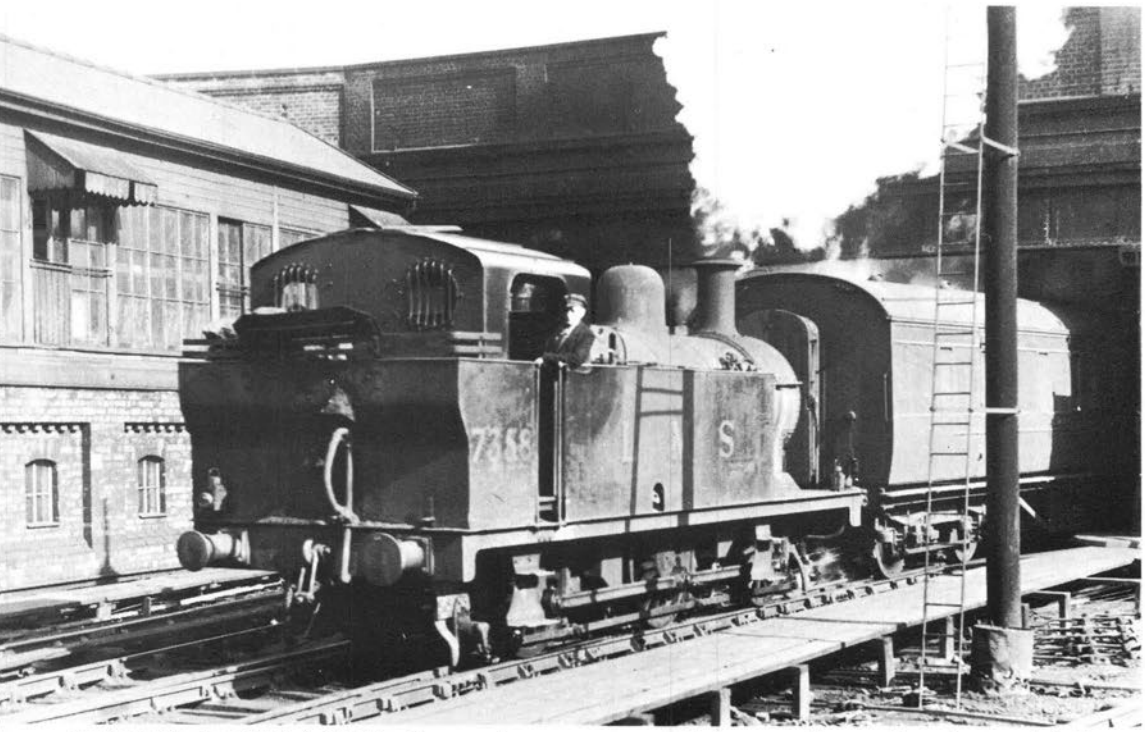



The Somerset and Dorset Joint Railway took delivery of seven 3F 0-6-0Ts from Bagnall, in 1928; numbered SDJR 19-25, and classified 3P3G. The LMSR took them into stock in 1930 when they were renumbered 7150-56; becoming Nos. 7310-16 in the 1934 renumbering scheme. Nos. 24 and 25 are seen at Templecombe in March 1929, in black SDJR livery. *[H. C. Casserley*

cylinders had slide valves actuated by Stephenson link motion. Tractive effort, at 85 per cent of the 160 lb sq in boiler pressure, was 18 400 lb at the rims of the 4ft 7in wheels. The wheelbase was the standard Derby 8ft plus 8ft 6in spacing. The weight varied slightly with different batches, from 49.5 tons to 50.5 tons. Steam and hand brakes were fitted to the engines and most had vacuum brake apparatus whilst some were equipped with steam heating for local passenger or empty coaching stock duties. Steam sanding gear was fitted to the front and back of the centre driving wheels. A few locos had screw-operated reversing gear, but the majority were fitted with a reversing lever.

The engines were built as follows:

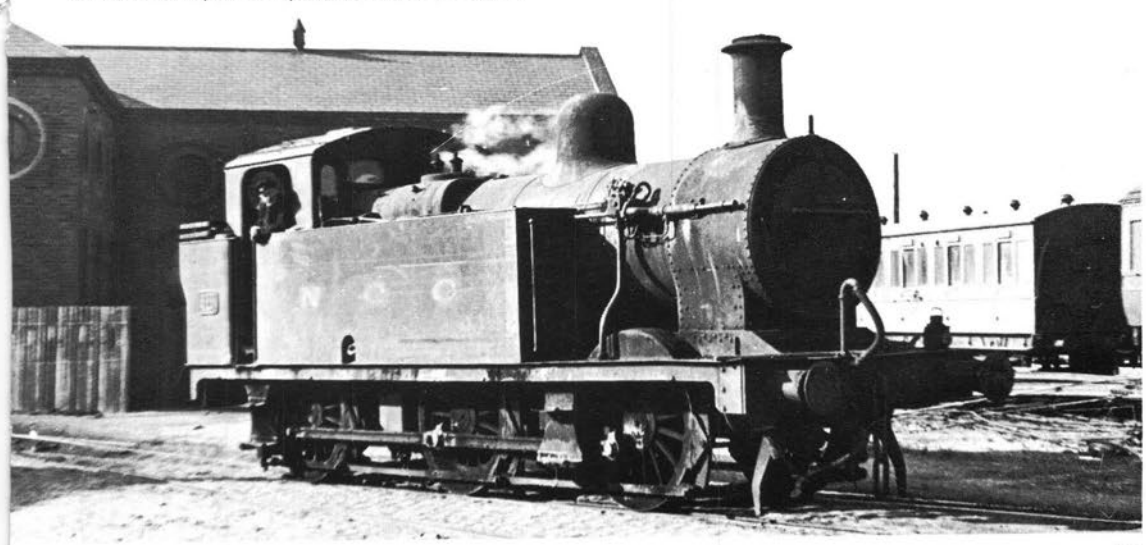
| | | |
|---|---|---|
| Nos 7100-7119 | Vulcan Foundry | 1924 |
| Nos 7120-7134 | North British | 1924 |
| Nos 7135-7141 | Hunslet | 1924 |
| Nos 7142-7149 | Hunslet | 1925 |
| Nos 16400-16459 | North British | 1926 |
| Nos 16460-16509 | Vulcan Foundry | 1926 |
| Nos 16510-16518 | Hunslet | 1926 |
| Nos 16519-16534 | Hunslet | 1927 |
| Nos 16535-16543 | Bagnall | 1926 |
| Nos 16544-16549 | Bagnall | 1927 |
| Nos 16550-16554 | Vulcan Foundry | 1928 |
| Nos 16555-16560 | Vulcan Foundry | 1927 |
| Nos 16561-16599 | Vulcan Foundry | 1928 |
| Nos 16600-16624 | Beardmore | 1928 |
| Nos 16625-16632 | Hunslet | 1927 |
| Nos 16633-16645 | Hunslet | 1928 |
| Nos 16646-16649 | Hunslet | 1928 |
| Nos 16650-16669 | Hunslet | 1928 |
| Nos 16670-16674 | Hunslet | 1929 |
| Nos 16675-16684 | Bagnall | 1928 |
| Nos 16685-16723 | Beardmore | 1928 |
| Nos 16724-16749 | Beardmore | 1929 |
| Nos 16750-16764 | Horwich | 1930 |



Typical duty for a 3F 0-6-0T. Shunting empty carriages at Euston is No. 7358, with bunker capacity increased by provision of an angled plate at the rear, attached to the coal rails. *[E. D. Bruton*

Two 3F 0-6-0Ts were withdrawn from LMSR stock, altered to 5ft 3in gauge and transferred to the LMSR-operated Northern Counties Committee line in Ireland, in 1944/5. Nos. 7456 and 7553 became NCC class Y Nos. 18/9 respectively. No. 18 was photographed at Belfast in April 1948.

*[H. C. Casserley*



Two 3F 0-6-0Ts standing outside Radstock shed (SDJR line) in February 1950. No. 7496 on the left retains LMSR smokebox numberplate and is fitted with a steam heating hosepipe. No. 47465 on the right, is in BR livery. *[Ivo Peters*

An additional seven locomotives were built for the Somerset and Dorset Joint Railway, as follows:

| | | |
|---|---|---|
| SDJR Nos 19-25 | Bagnall | 1928 |

These were taken into LMSR stock in 1930, becoming Nos 7150-7156.

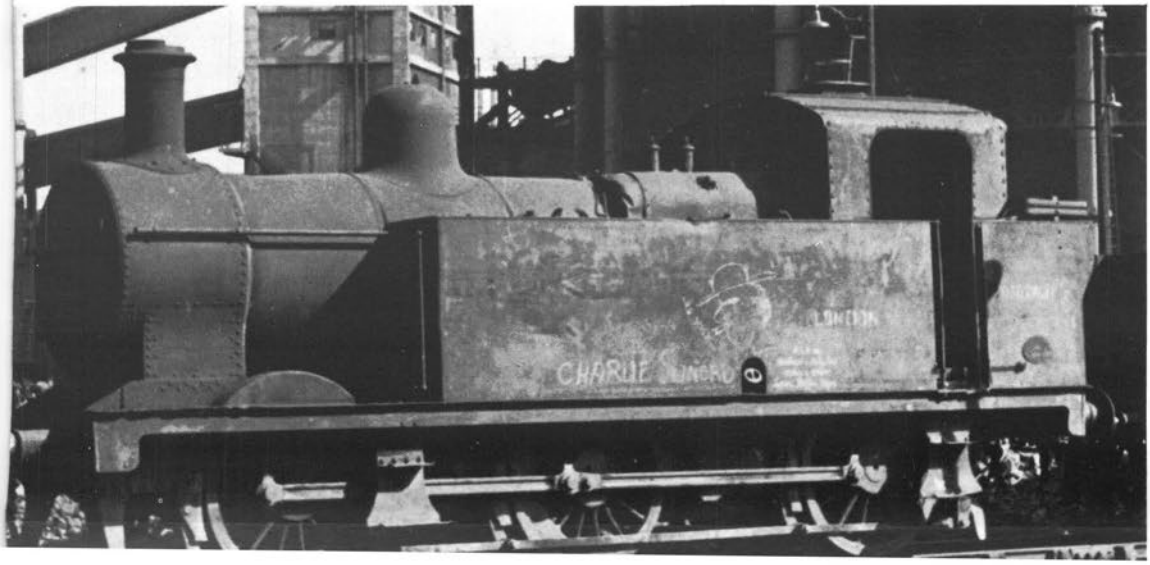
In 1934 the entire class was renumbered, with Nos 7100-7149 becoming Nos 7260-7309 and Nos 16400-16764 becoming Nos 7317-7681. The seven former SDJR locomotives filled the gap, becoming Nos 7310-7316. In BR days 40000 was added to all the numbers.

The 3F 0-6-0Ts, which were in later days sometimes wrongly nicknamed 'Jinties' (this nickname really belonging to the little 0-4-0T) were to be seen practically everywhere on the LMSR system and their duties ranged from shunting and local freight to those of banking engine or station pilot. They tended to be dismissed by enthusiasts in search of more glamorous steam types, but their contribution to the day-to-day running of the railway was enormous, until they were steadily displaced by the even less glamorous diesel-shunters.

**First of class withdrawn:** 47331 (1959)
**Last of class withdrawn:** 47629 (1967)
Nos. 7613/17/63 never returned from WD service in France; believed destroyed.
**Examples preserved:** 47327/57/83, 47445

Fitted for push-pull operations on the Swansea to Brynamman service, 3F 0-6-0T No. 47478, photographed at Swansea. Nos. 7477-81, 7655 and 7681 were fitted for push-pull working by the LMSR. *[Alec Swain*

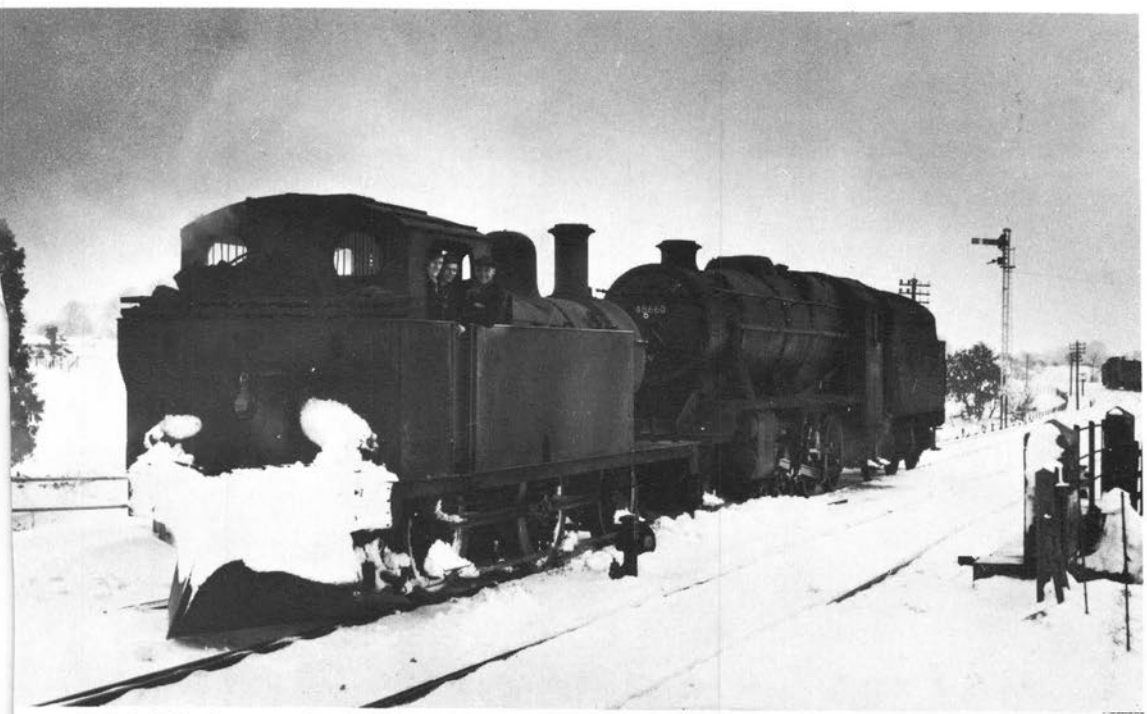
In 1940, eight 3F 0-6-0Ts were transferred to the War Department. No. 7589, 7607/11/3/7/59/60/3 were renumbered WD Nos. 14, 10, 9, 8, 15, 12, 11 and 13 respectively. In addition the LMSR prepared Nos 7629/4/9/31/8/43 as WD Nos. 23, 24, 22, 20, 19, and 21 respectively, but these were not sent to the WD. Two others were selected, Nos. 7591 and 7609 but not prepared. No. 7587 was at first prepared as WD No. 8, but No. 7613 was sent instead. Nos. 7589, 7607/11/59/60 were returned from France in 1948 and replaced in BR stock after thorough overhaul. The other three were written-off, and rumoured to have been sold overseas, but no evidence has come to light to suggest other than that they were simply withdrawn; or destroyed. The French Railways classified them 030 TW, and No. 030 TW27 (LMSR No. 7589) was photographed at Derby after return from France in September 1948. The engine had acquired a GWR chimney during its war service; probably from a 'Dean Goods' 0-6-0! *[H. C. Casserley*



Banking duties on Lickey, with a WR 0-6-0PT on trial. Two 3F 0-6-0Ts, Nos. 47301/5, with pannier tank No. 8402 (on loan from Cardiff) pushing hard to assist a northbound freight near Blackwell; September 1956. *[T. E. Williams*

On Winsor Hill, 3F 0-6-0T No. 47275 assists 7F 2-8-0 No. 53801 with an Exmouth to Cleethorpes train in August, 1960. *[Derek Cross*

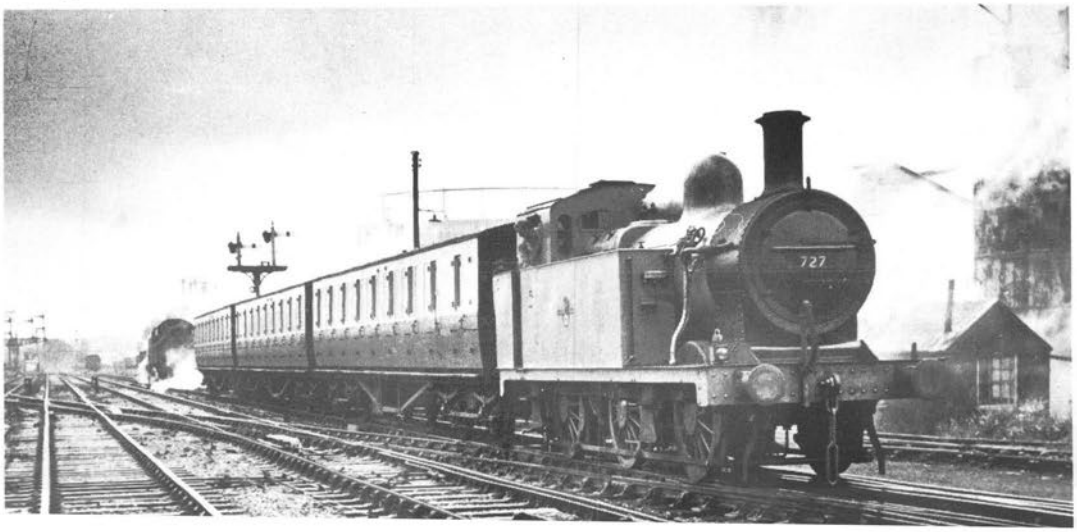
A decidedly impudent air about 3F 0-6-0T No. 47496 as she pilots rebuilt SR 'West Country' Pacific No. 34028 *Eddystone* into Bath with the up 'Pines Express'. The 3F had assisted the Pacific from Wellow, December 24, 1959. *[Ivo Peters*



3F 0-6-0T in the snow. No. 47496, again, this time seen fitted with a snow plough (which necessitated removal of the buffers) and seen here coupled to 8F 2-8-0 No. 48660 at Binegar during snow clearance operations in January 1963. The SDJR line had been completely blocked on top of the Mendips after severe blizzards. *[Ivo Peters*

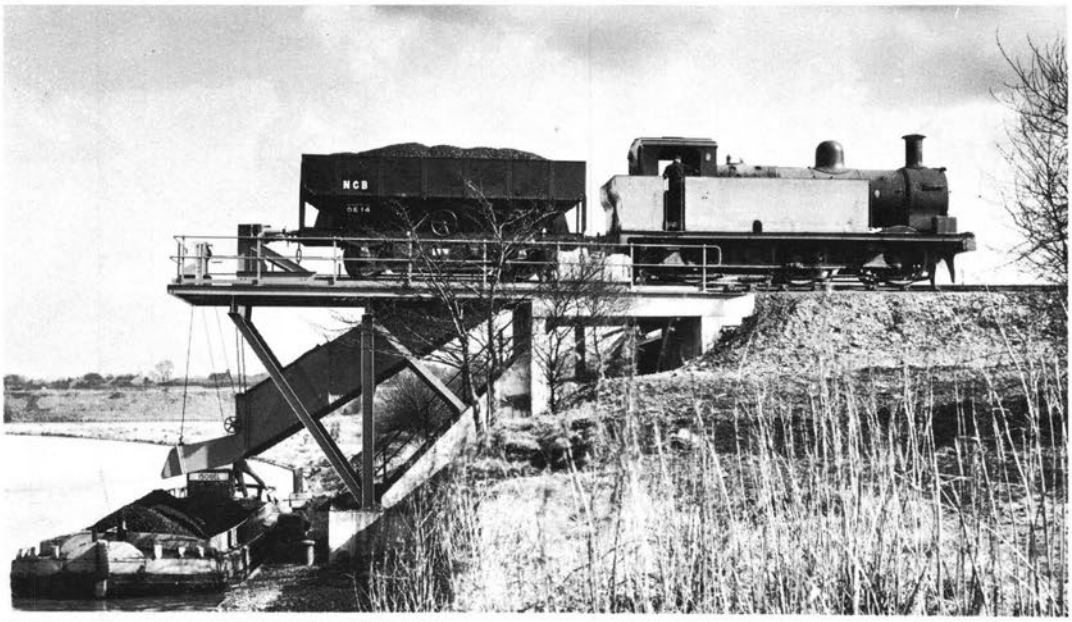
3F 0-6-0T amidst the flowers. No. 47275 shunting coal wagons at Midsomer Norton on the former SDJR line in July 1960. The length of steel rod which can be seen dangling from the smokebox front handrail was an 'uncoupling iron'; a feature of the 3F tanks shedded at Radstock. As a banked down freight passed Binegar down home signal the guard's instruction was to uncouple the banking engine. He leant from the rear of his van, removed the iron from the 3F's smokebox handrail and after uncoupling the engine, replaced it. The reason for the instruction to uncouple was that the 3F had to pick up the banking engine staff (for return from Masbury Summit to Binegar 'wrong line') and should the pick-up operation fail and the bank engine have to stop the risk of a break-away would be reduced. *[Derek Cross*

Painted Apple Green and with number altered to 727, 3F 0-6-0T No. 47276 was involved in the making of the film 'The Wrong Box' in September 1965. It is seen coupled to the curious low-roof BPGV coaches on the Western Region.
*[A. G. Newman*



Departmental duties for No. 47646 photographed at Crewe in the summer of 1964, standing outside the old Locomotive Works pay office. The engine carries reporting number W5 and shows the plate at the rear of the bunker to increase coal capacity.
*[J. B. Bucknall*

A livery 'freak' resulted from the general repair of No. 47482 at Darlington works in April 1964. The locomotive was repainted with the number in the typical position of NER tank engines! No. 47482 was photographed shunting at Crewe in March 1965.
*[J. Davenport*




Sold out-of-service by BR to British Oak Coal Screens, Crigglestone, near Wakefield, former No. 47445 is seen unloading coal into a barge on the Aire and Calder navigation at Calder Grove in April 1969. This locomotive, together with former BR Nos. 47327 and 47357 (from a South Wales scrapyard), is now owned by Derby Corporation and preserved by the Midland Railway Project Group at Derby. The engine has an additional sandbox on the front right hand running-plate, and has had the vacuum brake fittings removed.

*[Peter A. Hogarth*

Final run up the main line to Crewe for this 3F 0-6-0T, as she is seen passing Milford on the down slow line. With big ends knocking badly, No. 47266 is bound for the scrapper's torch. *[J. B. Bucknall*

## Section: 6

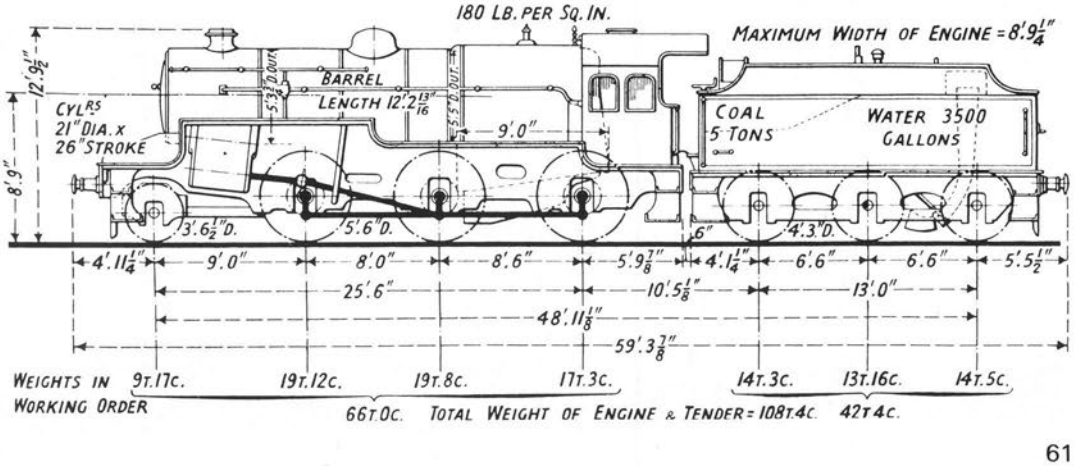
# 2-6-0 Class 4; later 5P4F; 5P5F; 5F
# Mixed Traffic Engines

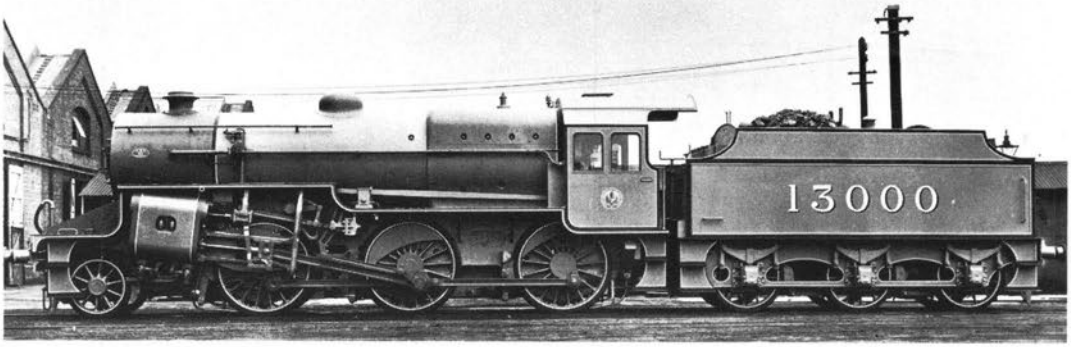
Introduced: 1926 Total: 245

The Caledonian Railway had prepared a new design of 2-6-0 mixed-traffic engine at the time of the Grouping, and this was examined by Hughes as a possible type for future LMSR use. However the English loading gauge was found to be too restrictive for the large horizontal cylinders of the Scottish engine, and accordingly Hughes re-thought the design, accepting the same power characteristics.

The Horwich version went through a number of design alternatives before being finalised for production. These schemes included the use of the Midland Compound boiler, the LNWR Prince of Wales boiler, the Hughes LYR Baltic tank boiler and completely new boilers (including one with top feed). The cylinders were at first moderately inclined, but the finalised design had very conspicuous steeply inclined cylinders, in order to fit the engine to the Midland line loading gauge. These required a very high running plate at the front end. This steep inclination was because Hughes refused to allow any higher boiler pressure than 180 lb per sq in, and this necessitated large cylinders of 21in diameter by 26in stroke. The design of the cylinders and of the valve gear was entirely new to Horwich. The robust long travel long lap Walschaerts valve gear was, in fact, based upon the current practice of the American Pennsylvania Railroad in its layout and details. Allied to this modern front end was the provision of substantial coupled axleboxes producing a design of modern concept and efficiency.

The first engine was not completed until after Hughes' retirement, and Fowler added a number of standard Derby fittings. The basic design remained unchanged, although E. S. Cox records, in volume one of his book *Locomotive Panorama* that on his first personal visit to Horwich, Fowler needed a lot






Works grey official broadside photograph of the first of the class, No. 13000, built at Horwich in March 1926. This mixed-traffic design, originally designated Class 4, was the first pure LMSR locomotive design to be constructed in quantity, and proved very satisfactory. The design was worked out in detail at Horwich, during the period when George Hughes was CME of the new railway company, and although the appearance was clearly influenced by LYR practice, the large cylinders and the valve gear were entirely new. They resulted from an intensive study of recent American practice; the Walschaerts valve gear was derived from Pennsylvania Railroad layout and details. Hughes retired before construction of No. 13000 had commenced, and Fowler insisted upon the application of Midland-type vacuum controlled steam brake and the standard 3 500 gallon tender. This latter feature was much narrower than the cab and did not match the lines of the locomotive, no matter what angle the ensemble was viewed from. Original layout of sanding gear can be seen on leading and trailing coupled wheels only.

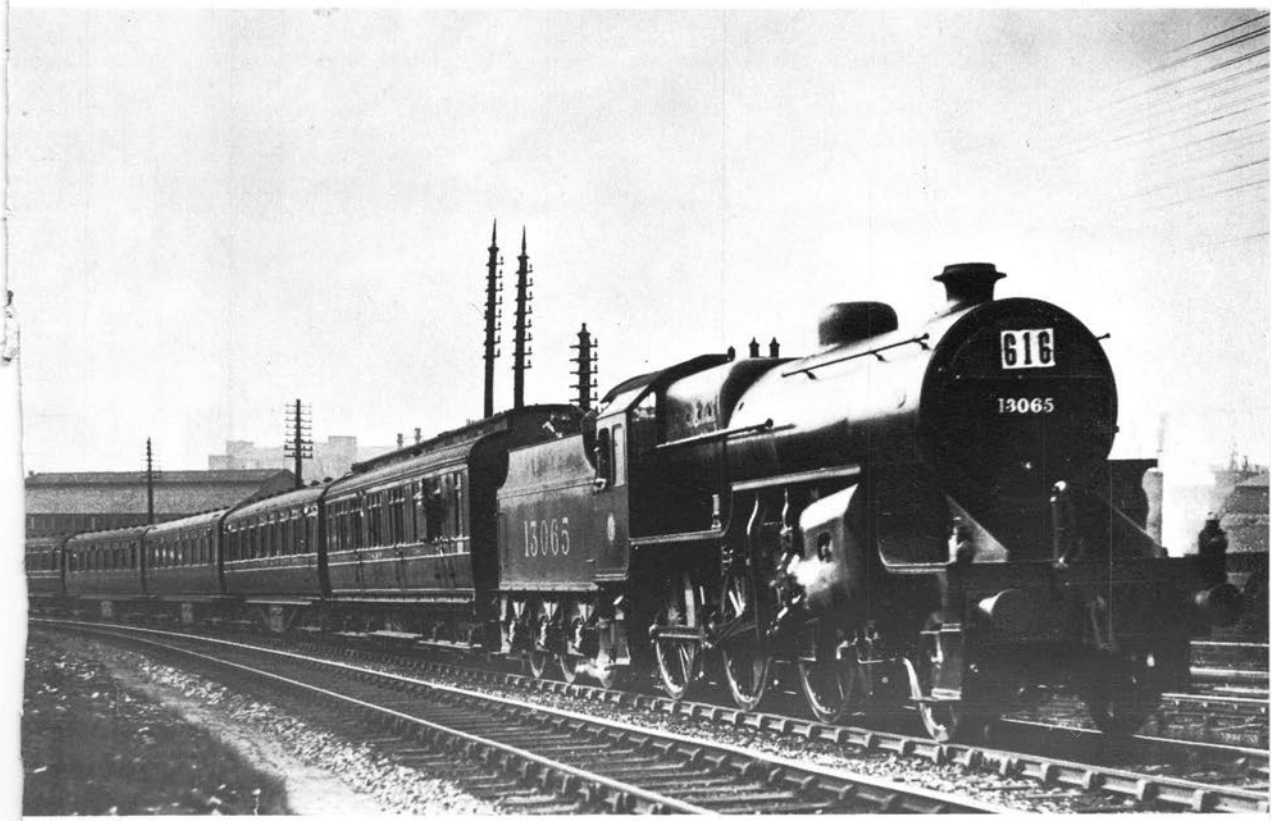
*[British Rail LM Region*

The first 100 locomotives of the class were originally turned-out in Crimson Lake passenger engine livery, as seen here on No. 13070. Unlike current Derby practice, a modern cab with side windows was provided and the engines had left hand drive. No steam heating hose was provided on the front end. Brakes were originally fitted to the leading Pony truck wheels; a feature removed by Stanier. *[Locomotive Publishing Company*

of persuading that it was too late to get one of the standard Derby boilers on to the new 2-6-0. He did insist upon application of the Midland vacuum controlled steam brake; Derby injectors and associated steam valves and clacks. Worst of all, the original LYR-style tender envisaged for the engine was replaced by the standard 3 500 gallon Fowler Midland design, despite the fact that it was considerably narrower than the locomotive, and did not really match the general lineaments of the Horwich design.

The parallel Belpaire boiler had the Ross pop safety valves set side by side on the firebox instead of in line, and the chimney design and smokebox door were of pure LYR style. The earlier locos built had many standard Horwich fittings in the cab, including the regulator handles and reversing wheels. The large and small tubes gave a heating surface of 1 345 sq ft, the firebox gave 160 sq ft and the superheater gave 307 sq ft. The tractive effort at 85 per cent of the 180 lb per sq in boiler pressure was 26 580 lb at the rims of the 5ft 6in driving wheels. Total weight of the engine and

The raised running-plate over the huge outside cylinders and the robust Walschaerts valve gear struck a decidedly modern note to followers of Derby practice, where inside cylinders and valve gear and trim exterior were the order of the day! The chimney was unmistakably Lancashire and Yorkshire in origin and unlike many of Fowlers' engines which lost their original chimneys in favour of Stanier or BR designs over the years, the 'Crabs' retained this distinctive adornment until the end. The Ross pop safety valves were placed side by side. No. 13065 was photographed leaving Nottingham with an up relief working to St. Pancras. *[T. G. Hepburn*



In 1931, five locomotives were supplied with Lentz rotary cam poppet valves, in place of the Walschaerts gear, as an experiment. These were Nos. 13118/22/24/25/29. No. 13124 is illustrated in the black livery with red lining, which superseded the Crimson Lake for the class. Layout of sanding gear altered to front of leading coupled wheel and front and back of centre coupled wheel.

*[British Rail LM Region*

tender in working order was 108 tons 4 cwt.

The engines were built as follows:

| | | |
|---|---|---|
| Nos 13000-13006 | Horwich | 1926 |
| Nos 13007-13029 | Horwich | 1927 |
| Nos 13030-13035 | Crewe | 1926 |
| Nos 13036-13099 | Crewe | 1927 |
| Nos 13100-13107 | Crewe | 1928 |
| Nos 13108-13109 | Crewe | 1929 |
| Nos 13110-13129 | Horwich | 1929 |
| Nos 13130-13149 | Horwich | 1930 |
| Nos 13150-13224 | Crewe | 1930 |
| Nos 13225-13234 | Crewe | 1931 |
| Nos 13235-13244 | Crewe | 1932 |

The class was renumbered in 1934, becoming Nos 2700-2944. In 1948 the BR numbering scheme added 40000.

The 'Crabs', or 'Land Crabs' as they were unofficially nicknamed (because of the rather ungainly pincer-like cylinder and valve gear layout), were undoubtedly efficient and successful engines. Fowler's contribution to their design was minimal, and they represented the only non-Derby inspired standard LMSR design produced in quantity during his regime; he clearly recognised their merit as an efficient mixed-traffic class which had no equivalent in existing Derby types.

**First of class withdrawn:** 42864/93, 42930 (1961)
**Last of class withdrawn:** 42942 (1967)
**Example preserved:** 42700

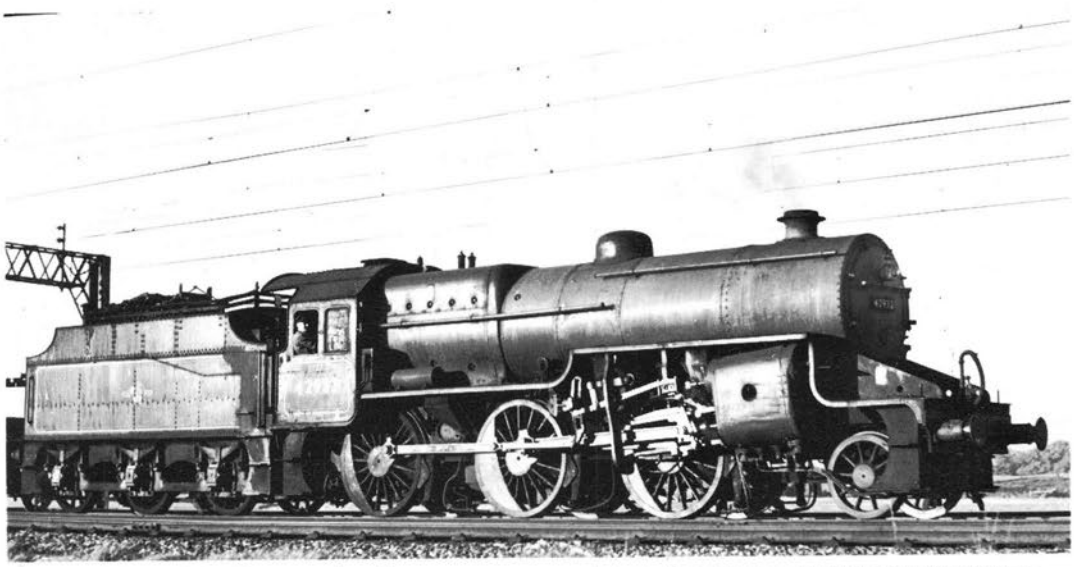
Striking power combination on a Cricklewood to Toton empty mineral wagon working, seen near Ayres End Lane, Herts. 2-6-0 No. 42763, with tender lettered LMS, double-heads Beyer-Garratt 2-6-6-2 No. 47987 in early BR days. The LMSR renumbered the 2-6-0s in 1934; Nos. 13000-13244 becoming Nos. 2700-2944 inclusive. British Railways added 40000 to the numbers.

*[E. D. Bruton*

The locomotives fitted with Lentz rotary cam gear ran in this form until 1953, when the same engines were selected for further valve gear experiments. The Lentz gear was replaced by Reidinger rotary valve gear during the early part of 1953. They were Nos. 42818/22/24/25/29 under BR ownership, and all five were withdrawn from service nine years later. *[British Rail LM Region*

The discrepancy in width between tender and cab is well revealed in this view of No. 42789 making heavy weather of a train of empties bound for Drongan Colliery, photographed at Annbank in August 1966. *[L. A. Nixon*

The nickname of 'Crab', or 'Land Crab' was derived from the rather ungainly front end, with the prominent cylinders and high running-plate. These features foreshadowed the practice of much later days, when late LMSR and BR locomotives set the fashion for high running-plates in no uncertain manner. 'Crab' 2-6-0 No. 42874 (with tender lettered 'British Railways') catches the evening sunlight passing Napsbury with a down unfitted freight; September, 1950. *[E. D. Bruton*



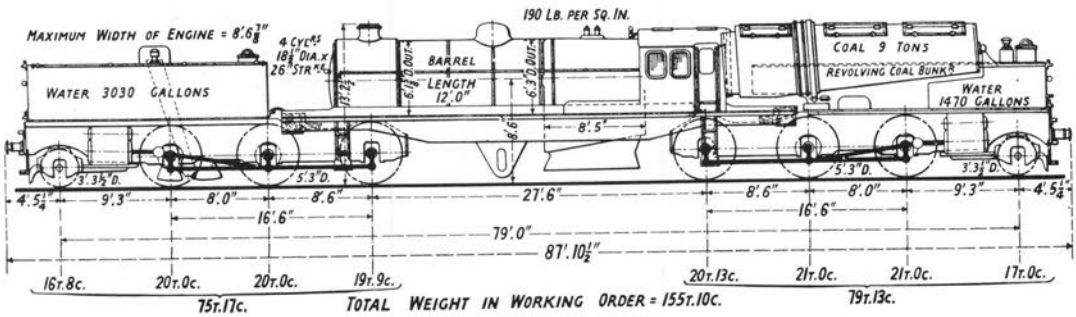
The appearance of the class was virtually unchanged throughout their careers. No. 42932 is seen here in final condition, with BR AWS equipment on the running-plate, and with coal rails added to the tender. Photographed passing Stafford, under the LMR 25 kv catenary. *[J. B. Bucknall*

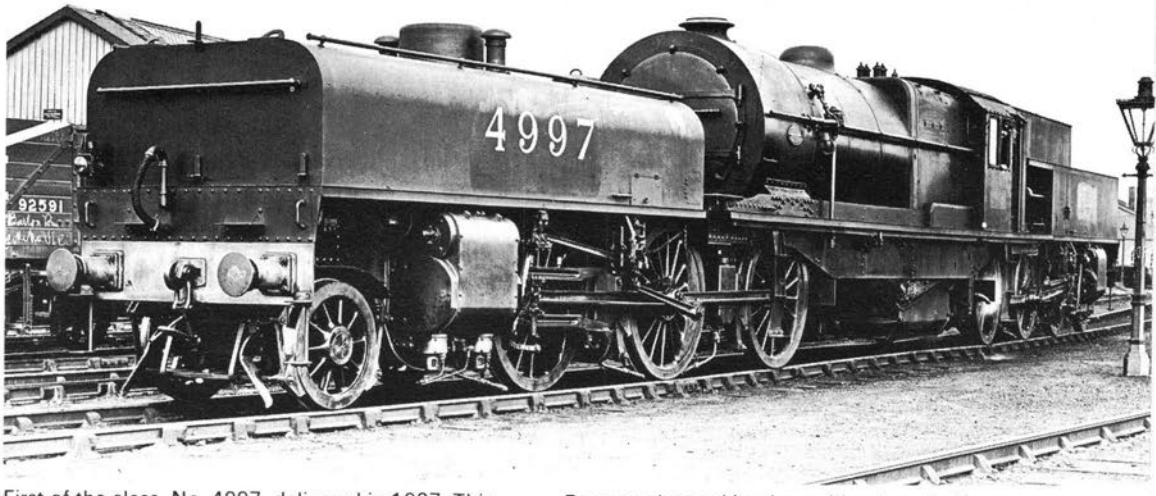
# Section: 7 2-6-0:0-6-2
## Mineral Engines
Introduced: 1927 Total: 33
Beyer-Garratt Type

Hughes had realised the desirability of finding a suitable large locomotive design to allow replacement of the double-headed 0-6-0s, on the Midland line Toton to Brent heavy coal traffic. The severe route restrictions in terms of overall dimensions and maximum axleloads made this a tricky problem. Two parallel solutions were considered; one a 2-8-2, the other a Garratt-type locomotive, and some serious development work went on with both proposals in 1924-25. Beyer-Peacock, who were patent-holders of the Garratt design, proposed a 2-6-2: 2-6-2 locomotive, whilst Horwich drew-up a four cylinder 2-8-2; later altered to a three cylinder layout. Even the MR 0-10-0 Lickey Banking Engine (see page 32) made an abortive trial run from Wellingborough to Brent in July 1924, to study the feasibility of such a type, but when Hughes retired in 1925 nothing had been finalised. Fowler stopped work on the three cylinder 2-8-2 at Horwich drawing office and requested them to re-scheme it as a compound locomotive (together with the corresponding 4-6-2 passenger design which Hughes had been developing).

The transfer of LMSR locomotive design away from Horwich after Hughes' retirement, gave the Derby school its head, but even there disagreement existed between Fowler, the new CME, and Anderson the Motive Power Superintendent. In volume one of his book *Locomotive Panorama*, E. S. Cox discloses that Derby had been making independent approaches to Beyer-Peacock for an alternative Garratt design to the one initiated by Horwich—such was the unsettled political background to early LMSR locomotive affairs! Unlike the Horwich version, the design Beyer Peacock produced for Derby (at Anderson's request, not Fowler's) was 'Midlandised' in most respects except the boiler and frames. All the detail work was to Derby specifications, with the result that short travel valve gear was used, with the same cylinder and motion arrangement as designed for the 1914 batch

The drawing shows the locomotive fitted with a 9 ton revolving coal bunker, *circa* 1931.



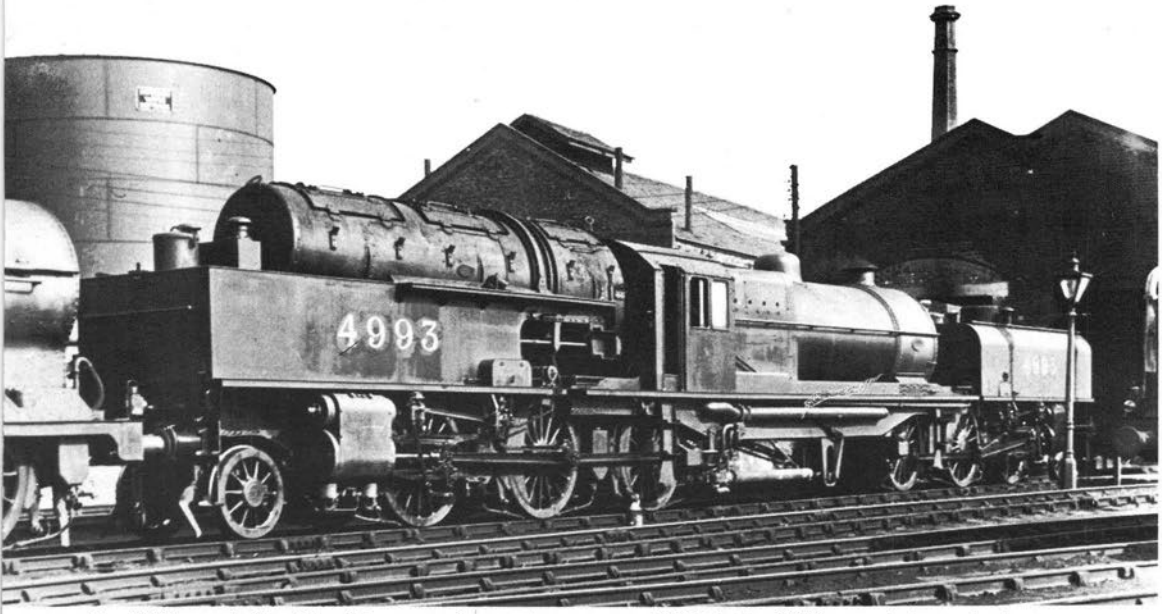



First of the class, No. 4997, delivered in 1927. This initial batch of three were the only examples of the 33 Garratts to be fitted with the vacuum brake.

Rectangular coal bunker, without coal rails; brakes on leading pony wheels; squat chimney; screw couplings. *[Locomotive Publishing Company*

The second batch of 30 built by Beyer Peacock in 1930 were not vacuum fitted, and carried link couplings. The coal bunker was of improved design with the top curved inwards, avoiding the need for coal rails. The chimney height was increased slightly. No. 4994 was photographed north of Elstree with a down empty wagon train.

*[F. R. Hebron*




No. 4986 was built with a 9 ton capacity rotating coal bunker of Beyer Peacock design. This was later transferred to No. 4997, and a larger 10 ton version was fitted to Nos. 4967-96 inclusive in 1932-3. No. 4993 was photographed at Wellingborough. A scheme to fit one of the 1930 batch with Spencer's inclined mechanical coal pusher was abandoned. *[T. G. Hepburn*

of SDJR 2-8-0s. Even worse, the axlebox bearing sizes were to the traditional Derby standards, quite inadequate for the new locomotives. The Hughes mixed-traffic 2-6-0s, already in service and the new Royal Scot 4-6-0 and class 4P 2-6-4T designs, concurrently under development, all had generous bearing sizes and long-lap valve gear, but somehow the design of the Garratts was allowed to reach completion with these modern design features completely ignored.

Work was stopped on Fowler's 2-8-2 Compound design and three prototype 2-6-0 : 0-6-2 Garratts were delivered from Beyer Peacock in 1927. These were fitted with vacuum brakes and had a fixed coal bunker of 7 tons capacity, plus tanks at each end with a total capacity of 4 700 gallons. These three locomotives had a weight in working order of 148.75 tons.

The boiler, of Beyer Peacock design with Belpaire firebox, had an evaporative heating surface of 2 137 sq ft, made up of tubes 1 954 sq ft and firebox 183 sq ft. The 36-element superheater provided a heating surface of 500 sq ft. Boiler pressure was set at 190 lb per sq in, with four Ross pop safety valves. The four cylinders, 18½in diameter by 26in stroke had overhead piston valves actuated by Walschaerts gear. The tractive effort at 85 per cent boiler pressure was 45 620 lb at the rims of the 5ft 3in coupled wheels. Fully laden, the maximum axleload was 21 tons.

Three years elapsed whilst a series of trials took place which showed that despite some defects in the design, they were indeed capable of working single-handed the same coal trains which required double-heading by 0-6-0s, and at the same average speed of 17 m.p.h. They showed no specific coal saving (and of course one fireman had to do all the work) and their inadequate bearings brought them into shops for repairs far too quickly. Nevertheless, an additional 30 were delivered in 1930, with a slight improvement in efficiency gained by fitting double ex-

No. 4999 of the original batch, seen hauling a coal train near Elstree. Coal rail added to the bunker top. This view clearly illustrates the two sets of Ross pop safety valves, the double cab-roof ventilators, and the very squat chimney originally fitted.

*[E. R. Wethersett*

haust valves. This second batch incorporated a number of modifications and they were not fitted with the vacuum brake. The coal bunker capacity was increased to 9 tons, and the water capacity was 4 500 gallons. Most of the water was contained in the tank at the front end, which also had water pick-up apparatus which could be used in either direction of running. Total weight was increased to 155.5 tons in full working order. One of the 1930 batch, No. 4986, was ordered with a Beyer Peacock patent self-trimming rotating coal bunker, and following trials with this, Nos 4967-4996 were all fitted with 10 ton capacity rotating bunkers in 1932-33. The prototype rotating bunker (which had 9 ton capacity) was then transferred to No. 4997.

The engines were built as follows:

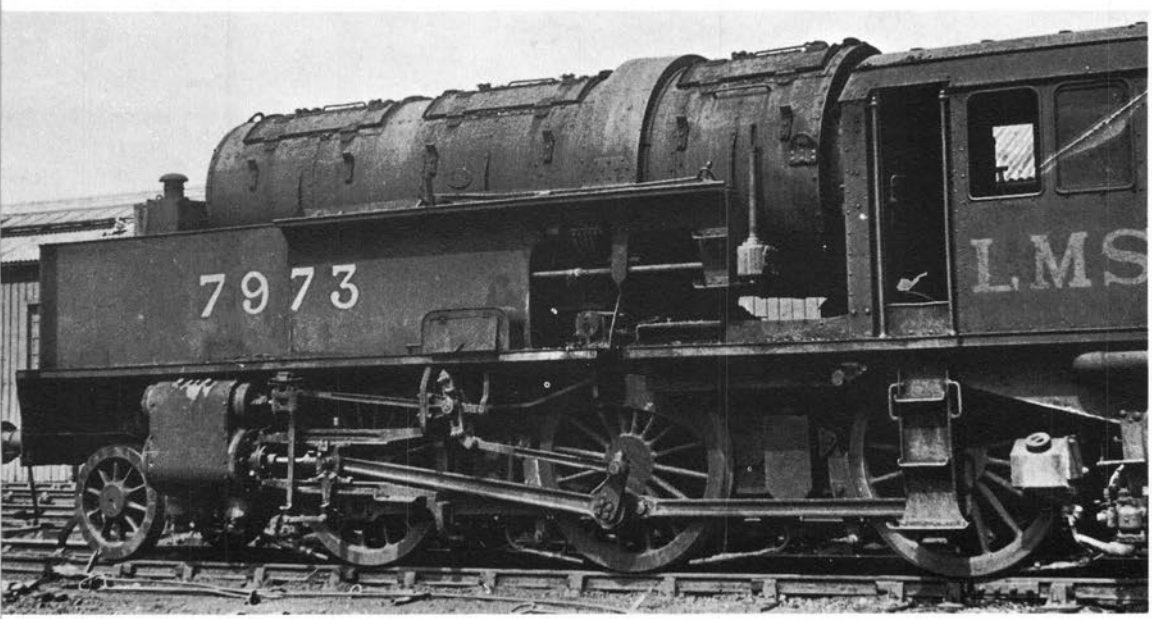
| | | |
|---|---|---|
| Nos 4997-4999 | Beyer Peacock | 1927 |
| Nos 4967-4996 | Beyer Peacock | 1930 |

The engines were renumbered in 1938, becoming Nos 7967-7999 and 40000 was added under the 1948 BR scheme.

One can only speculate what the outcome would have been if Beyer Peacock had been allowed to proceed with their suggested 2-6-2 : 2-6-2 design, without Derby interference. Certainly the valve gear and bearings would have been of more suitable and adequate design, and the LMSR would probably have had a class of powerful modern engines, more worthy of the Garratt principle than the undershod specimens which trundled up-and-down the Midland line for some 25 to 28 years without ever attracting much attention to themselves.

**First of class withdrawn:** 47985, 47990 (1955)
**Last of class withdrawn:** 47994 (1958)
**None preserved**

Close-up of the steam-driven rotary coal bunker as applied to the 1930 batch of Beyer-Garratts in 1932-3. The locomotives were renumbered in 1939: Nos. 4997-99 became Nos. 7997-99 and Nos. 4967-96 became Nos. 7967-96. This view of No. 7973 was taken at Cricklewood in June 1945. The valve gear arrangement was based upon that used for the SDJR 2-8-0s. *[H. C. Casserley*



Weird effect of a Beyer-Garratt seen working bunker-first ! The engine was photographed working a down freight on the bank between Manton Jct. and Oakham, *circa* 1954. *[P. H. Wells*

No. 47998 (originally 4998) of the first batch, seen running in May 1950 still with the original rigid coal bunker. No. 47999 also retained this feature. The vacuum brake was also retained. The locomotive was photographed approaching Castle Bromwich with a westbound goods train.

*[E. D. Bruton*

No. 47982 passing Chesterfield with a down train of empty coal wagons. The career of the LMSR Beyer-Garratts was an undistinguished affair; they were not a good example of their breed, by virtue of their weak valve gear layout and sadly undersized bearings. Thought was given in 1930/32 to building further Garratts for main line services and for the Highland line, but nothing materialised; several designs were proposed including Compound Garratts. In 1948/49 the idea of a light Pacific Garratt design was considered by BR for Scotland, but again not proceeded with. A replacement design for the 33 LMSR locomotives was also evaluated at this time but traffic requirements had changed sufficiently to allow the Stanier 2-8-0s to cope with the traffic. This new design would have featured a mechanical stoker.

*[T. G. Hepburn*

Recovering from a signal check at Stamford, No. 47969 makes a fine sight at the head of a freight for Peterborough on a cold January day in 1952.
*[P. H. Wells*

## Section: 8 4-6-0 Class 6; later 6P Express Passenger Engines

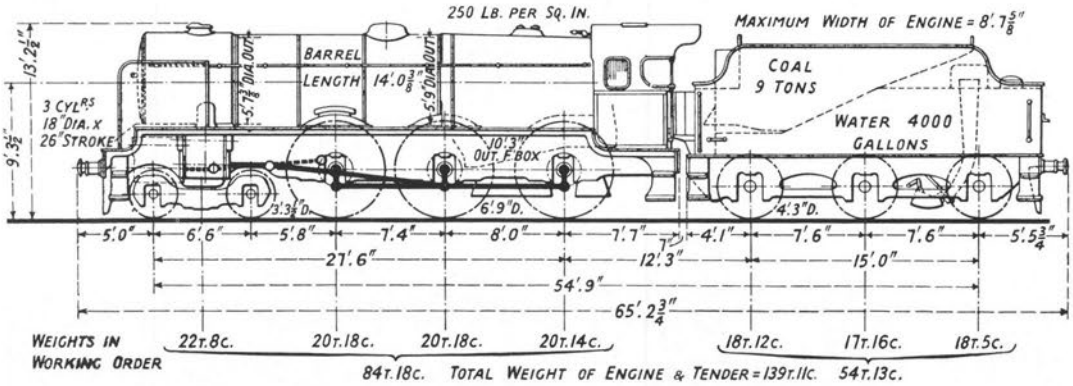
Introduced: 1927 Total: 70

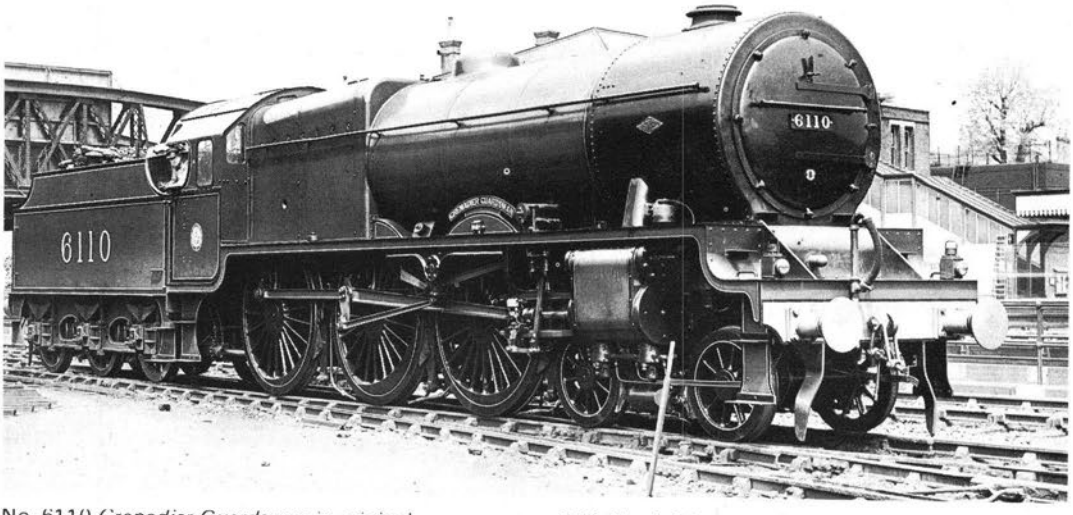
Royal Scot Class

The background story leading to the hurried design and construction of the Royal Scots is discussed in the introductory pages, and does not require further repetition here. The following notes are concerned only with the engines as actually delivered to the LMSR for service. The 'Scots' represented a tremendous advance in the available express passenger power of the LMSR, and allowed a considerable improvement to be made to the West Coast Anglo-Scottish services; largely eliminating the need for double-heading on the hilly sections.

The first batch of 50 was ordered straight off the drawing board, with only a broad outline proposal of what was required, in an attempt to have some at least ready in time for the 1927 summer timetable. None of the LMSR workshops had the necessary capacity available to take on such a stiff proposition, and the main design work, together with the building order, was tackled by the North British Locomotive Co., at Glasgow. This company had two works and a huge drawing office staff available, and the detail design was drawn-up by North British, in close collaboration with Derby. The letter of intent was signed in December 1926 together with a skeleton diagram of what was required. The actual order was placed in February 1927, with an agreed price of £7 725 per engine and tender. Even the huge resources of North British could not meet the required delivery date. The two works—Queen's Park and Hyde Park—had been given orders for 25 locomotives each, and it was the Queen's Park works which completed the first one, No. 6100, which was despatched to the LMSR on July 14, 1927. The complete batch of 50 was delivered by November 15 the same year.

The drawing shows a 'Royal Scot' after addition of smoke deflectors and Stanier high-sided curved-top tender.





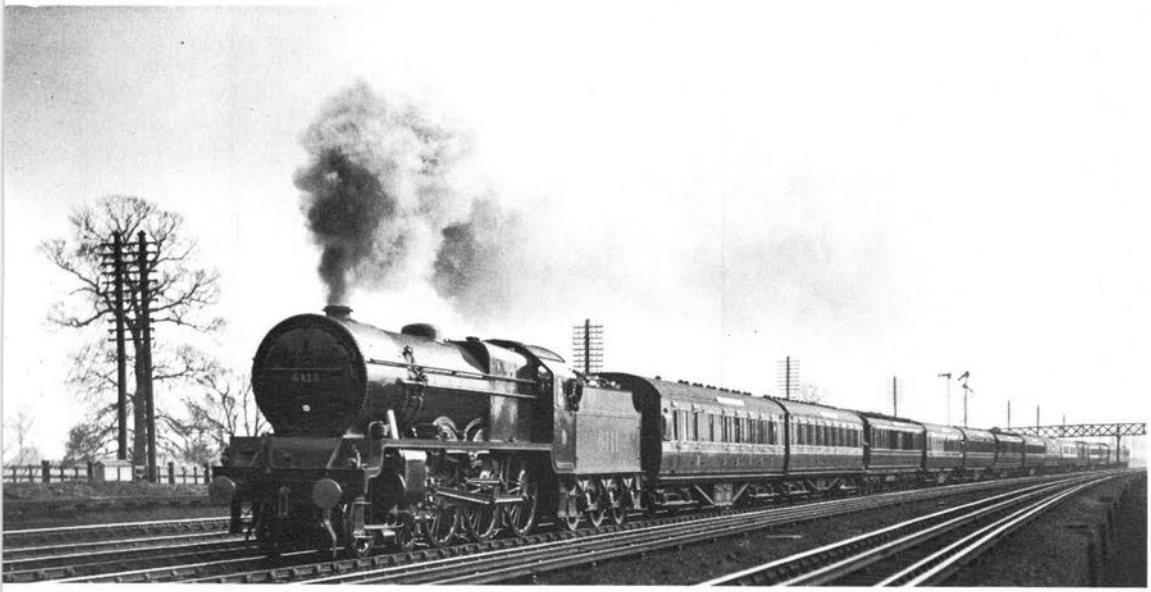

No. 6110 *Grenadier Guardsman* in original condition; photographed at Camden. The 50 North British engines were all delivered straight off the drawing board. The external appearance was perhaps spoilt by the remarkably small chimney which was only $7\frac{7}{16}$in high with a diameter of 1ft 3in. A false outer chimney casing might have enhanced the frontal appearance of what was otherwise a most impressive machine. The standard Derby tender was another weak visual point, scarcely matching-up to the lines of the engine.

*[Locomotive Publishing Company*

The last week of August 1927 first saw the new 'Royal Scot' put into traffic, and they proved immediately successful. No. 6109 *Royal Engineer* was photographed climbing Madeley Bank with the 5.45 p.m. London express from Crewe, *circa* 1929.

When new the engines had bogie brakes and a vacuum pump connected by a rigid arm to the crosshead on the left-hand side. Both these features were removed in the 1930s, by Stanier.

*[F. R. Hebron*



No. 6111 *Royal Fusilier* heads the down 'Midday-Scot' past the rural fields of Kenton, Middlesex in 1928. The narrow Fowler tender certainly appeared in every way inadequate for the massive locomotive and the 15-coach express it was handling! *[F. R. Hebron*

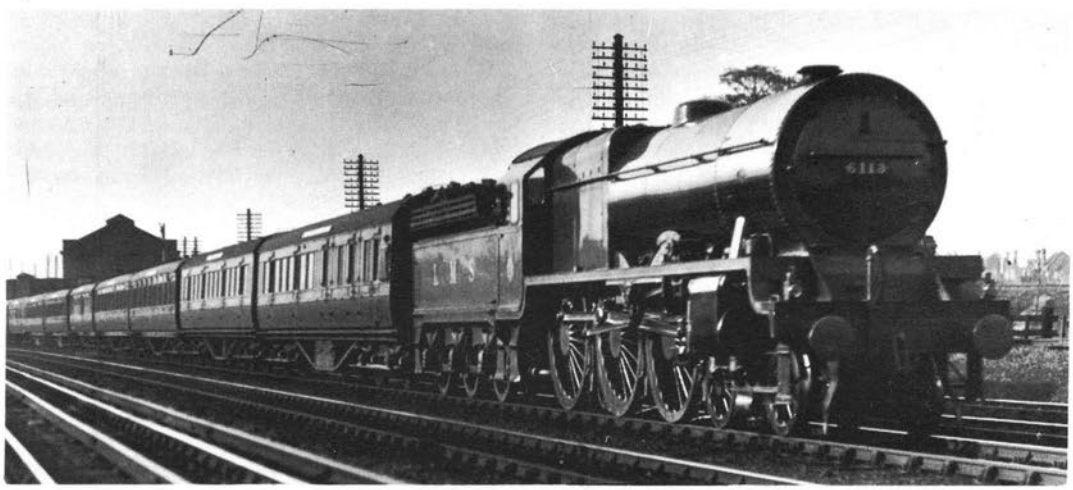
The new engines had three 18in diameter by 26in stroke cylinders, each with its independent Walschaerts valve gear. Valve travel was initially 6.3in maximum with 1 $\frac{1}{2}$in steam lap and nil exhaust clearance; lead was $\frac{3}{16}$in. The inside cylinder was arranged to drive the leading driving axle, and the two outside cylinders drove the middle axle; the cranks being set at 120 degrees. The design of the cylinders and valve gear was based upon current Derby practice. The outside motion was developed from the design prepared for the new 4P 2-6-4Ts, whilst the connecting rod big end between the frames was from the Compound 4-4-0s.

The boiler design was based upon the 0-10-0 Lickey Banking engine and as finally built it had a total heating surface of 2 081 sq ft, made up from a tube heating surface of 1 892 sq ft, and a firebox heating surface of 189 sq ft. The superheater surface 399 sq ft. Boiler pressure was set at 250 lb per sq in, which at 85 per cent boiler pressure produced a tractive effort of 33 150 lb at the rims of the 6ft 9in driving wheels. The weight in working order of the engine was 84 tons 18 cwt. and the standard Fowler tender first fitted brought the weight of the complete locomotive up to 127 tons 12 cwt. When Stanier high-sided curved-top 4 000 gallon tenders were later substituted, the total weight of the locomotive in full working order was increased to 139 tons 11 cwt. During construction of the 50 locomotives proposals were made that one should be fitted with Caprotti poppet-valve motion and another should be built as a compound; neither scheme was pursued.

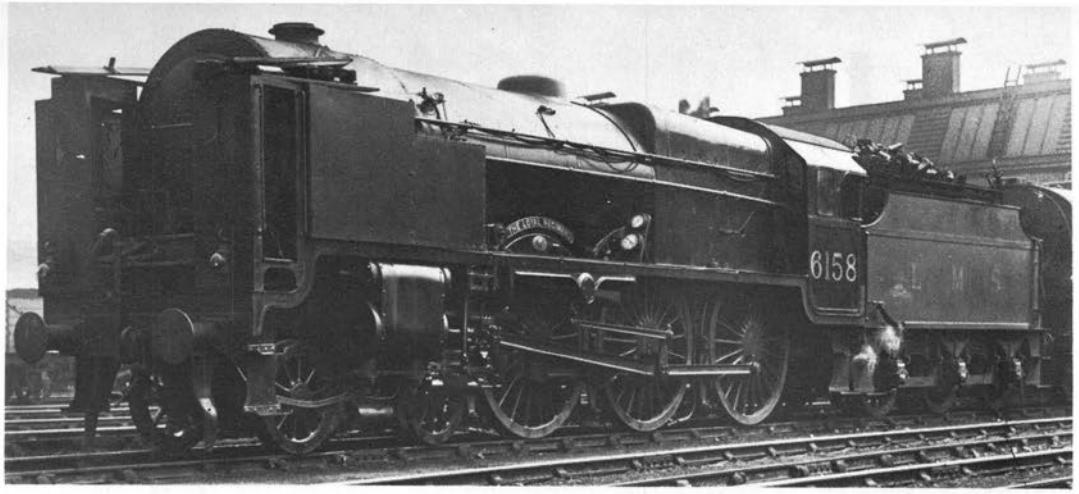
The new locomotives proved to be immediately successful in service and from September 26, 1927 the 'Royal Scot' train, worked by the new engines, commenced running non-stop between Euston and Carlisle; with 15 coaches weighing some 415-420 tons tare.

The success of the type led to an order being placed for a further 20. This time Derby took the job on, and the order was placed late in 1929 to be ready in time for the following summer timetable. This required the first engine to be completed on May 23 and handed over to traffic on May 31. These dates were adhered to; the

No. 6125, before she received nameplates; photographed at Camden. This locomotive was the first 'Royal Scot' to be completed by North British, at their Hyde Park works in Glasgow. In fact she posed for the first official photographs, temporarily renumbered 6100, although the real No. 6100 of the Queen's Park batch (6100-6124) was the first engine completed. No. 6125 became *Lancashire Witch*. The Queen's Park batch were named after famous regiments of the British Army and the Hyde Park batch bore the names of early steam locomotives; the original bearer of these latter names being represented by a small line-engraved brass plate below the nameplate, from 1929 onwards. *[Locomotive Publishing Company*



Reference has already been made in Section 4, page 40 to the non-stop Euston-Glasgow and Edinburgh runs of Friday, April 27, 1928, when the LMSR stole the publicity from the LNER non-stops due to commence running between Kings Cross and Edinburgh the following Monday. The Glasgow portion of the specially divided 'Royal Scot' express was hauled by No. 6113 *Cameronian*, fitted with one of the three specially modified Deeley tenders (the other two were attached to Compound 4-4-0s). The tenders were apparently supplied at the request of the volunteer crews which comprised two drivers and one fireman in each case, in order to ensure sufficient fuel for the run. No. 6113 is seen, with the tender used, on an up Western Division express near Kenton.
*[Locomotive Publishing Company*




A further 20 'Royal Scots' were ordered in 1929, to be ready for the following summer's traffic. Derby secured the order and kept to the schedule, with the frames for the first engine, No. 6150, laid down on May 5, 1930 and the completed engine painted and ready for traffic on May 31. This batch, Nos. 6150-69, had several small detail changes and (on the last 14 engines) one important one—a change in the piston-valve sealing. Coal rails were fitted to the Fowler tenders to increase capacity.

The Derby engines were named after further regiments of the British Army, except for the last two, Nos. 6168 *The Girl Guide* and 6169 *The Boy Scout*. Fowler had a personal interest in scout activities, which could account for these two names being selected. No. 6158 *The Loyal Regiment* was photographed in Crewe North shed, with indicator shelters on the front end, during trials with the new six-ring piston-valve head, later adopted for the whole class. *[T. G. Hepburn*

first engine actually being delivered within minutes of the agreed time! The boilers for the Derby batch were built at Crewe. Some small detail improvements were made with this batch, and the last 14 of the batch had four narrow piston rings in each piston-valve head, except No. 6158 which had six. An alarming increase in coal consumption had been observed with the first 50 engines since their construction only two or so years earlier. This was due to the single wide ring, with which each piston-valve head was fitted; this permitted steam leakage as wear took place. Following trials, No. 6158 eventually set the pattern, with six rings per head, and the whole class was modified together with some minor changes in valve events, not only reducing steam wastage due to internal leakage from 80 per cent to 8 per cent, but also improving efficiency overall.

The engines were built as follows:

| | | |
|---|---|---|
| Nos 6100-6149 | North British | 1927 |
| Nos 6150-6169 | Derby | 1930 |

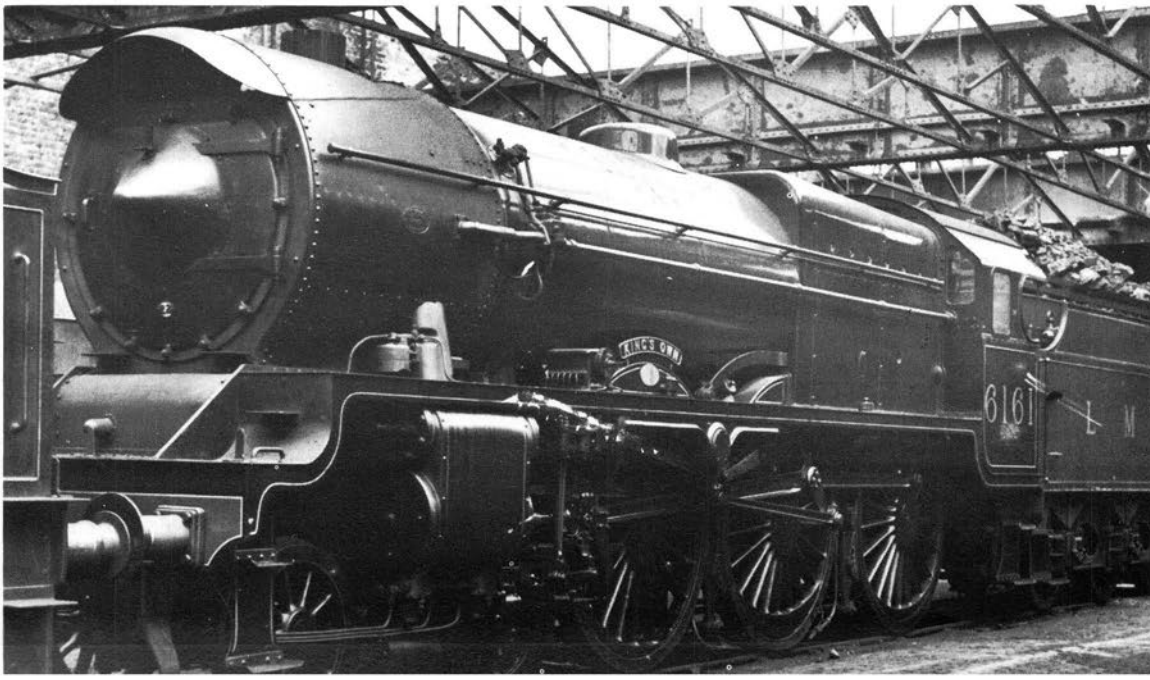
40000 was added to the numbers by BR in 1948.

The names were added to the locomotives after entry into service (see list of names on page 126) but it is worthwhile placing on record once and for all that No. 6100 was in fact named after the 'Royal Scot' train, *not* the Regiment. The records show that No. 6100 was made available for inspection at Derby after a meeting held on July 27, 1927. Sir Henry Fowler suggested that the locomotive be named *The Royal Scot* after the train of that name; this was agreed, and it was decided not to name the remainder. It was not until 26 October that a list of names was proposed for the whole order of 50.

Perhaps it was only to be expected that a design prepared with such haste should reveal further weaknesses as mileages were built-up. In addition to the steam wastage already mentioned, it was found necessary to alter the coupled axle boxes (undertaken by Stanier in 1933) to Swindon type, and to modify the leading bogie. The locomotive, No. 6100 which was sent to America in 1933 had a completely new Swindon type bogie fitted. Improvements were made to the springing, and in the 1930s the

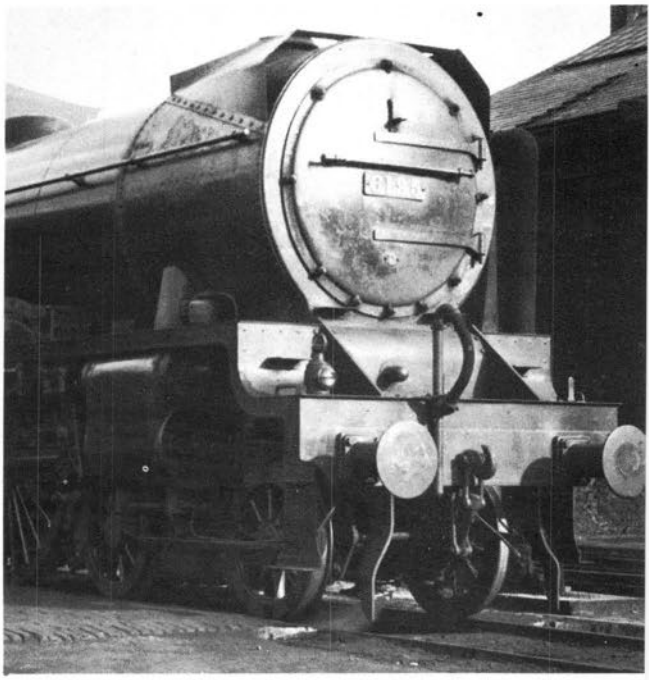
No. 6100 *Royal Scot,* on an up express on Bushey troughs. The engine is seen with small deflector plates on each side of the chimney, one of a series of experiments commenced in 1929 in an attempt to cure drifting exhaust, which sometimes obscured the driver's view. The derailment of No. 6114 at Leighton Buzzard in 1931 (believed to have been partially caused by loss of vision, due to drifting exhaust) led to the Ministry of Transport inspector's recommendation that smoke-deflectors of large size, similar to those already in use on the SR, should be tested. *[Locomotive Publishing Company*

A smoke box deflection experiment which involved a cut-away smoke-box top and stovepipe chimney, on No. 6161 *King's Own*; similar to experiments carried out by the LNER on their Pacific locomotive *Humorist*. Note the small conical projection on the smokebox door. *[Photomatic*



A further smoke-deflection experiment on No. 6133 *Vulcan*. None of these modifications could be described as aesthetically pleasing !

*[F. R. Hebron*



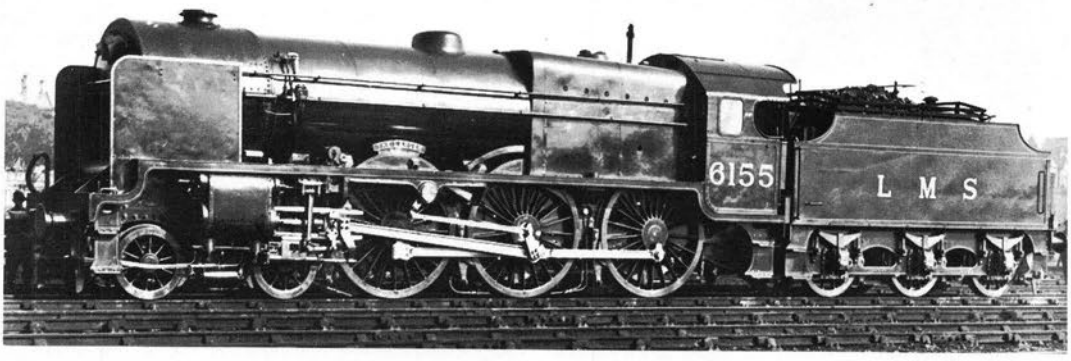
Yet another attempt to solve the smoke-deflection problem, *circa* 1931. The volume of air displaced was too small and localised to have any real effect. No. 6125 *Lancashire Witch*. *[Author's Collection*

cylinder by-pass valves, the bogie brakes and crosshead-driven vacuum pumps were all removed.

The 'Scots' were surpassed in their finest years by the exploits of the Stanier Pacifics, and they were more frequently to be seen on the London-Liverpool and Manchester runs than on the Anglo-Scottish turns. Trouble arose, as the engines grew older, with the 'built-up' type of smokebox drawing air, a defect which was not cured by the addition of extra lugs around the base of the smokebox door. Another modification, authorised in March 1934, involved the introduction of cross-stays between the horn cheeks of the intermediate and trailing axles, to prevent the frames spreading. The ashpan was rearranged to suit.

Leaky smokeboxes, cracked frames, and boilers due for renewal after some 12 to 15 years use were just three of the factors which led to the decision to modify the 'Scots', or to be more accurate, to renew them with Stanier taper-boilers; new circular smokeboxes with double chimney and blast pipe; new bogies; new coupled wheel centres and in some cases new frames. This period in the Royal Scot class life story is dealt with in Section 13, page 107, of *Stanier Locomotives*. The programme commenced in 1943 with the conversion of No. 6103 and was not completed until 1955 when No. 46137 emerged from Crewe in rebuilt form.

Few steam locomotive designs were ever conceived in such a frantic manner; few had such an impact upon the day-to-day running of a great railway; few captured popular admiration more completely. The 'Scots' were great engines, despite their weaknesses; made even greater in their later years by Stanier's brilliant rebuilding.




The decision was finally taken to fit all the engines of the class with large side-shield smoke deflectors, and all 70 were so treated by April 1932. Some early examples had vertical shields, such as is seen here on No. 6155 *The Lancer*, where the beading on the edges has been burnished to a bright metal finish. Photographed at Carlisle Kingmoor. *[T. G. Hepburn*

In 1933, with William Stanier recently appointed as the new CME of the railway, the LMSR received an invitation to send a locomotive and train to the United States of America to be exhibited at the Chicago 'Century of Progress' exhibition. There can be little doubt that Stanier would have sent one of his new Pacifics, if one could have been got ready in time. But this was impossible and instead No. 6100 *Royal Scot* was completely refurbished at Derby, with new axleboxes to Stanier's specification, and a new bogie of GWR-De Glehn side-bearer type; together with numerous smaller modifications. It has often been claimed that it was actually No. 6152, renumbered 6100, that went to America, but no proof has come to light since to substantiate this. The tender was a larger low-sided six-wheeled design, as fitted to the first two 'Princess Royal' 4-6-2s in 1933, and was, in fact, intended for No. 6202, the locomotive constructed as a turbine-propulsion experiment by Stanier in 1935; it had Timken roller-bearings and a coal capacity of 8 tons. No. 6100 *Royal Scot* is seen here during the American visit, complete with policeman on guard in the foreground. *[H. W. Pontin*

Rebuilding was undertaken as follows:

1943 (9) 6103/8/9/12/7/24/5/32/46
1944 (9) 6116/9/20/7/9/31/3/8/45
1945 (11) 6101/22/6/44/9/50/2/9/60/6/9
1946 (10) 6104/14/8/21/8/39/47/57/61/8
1947 (4) 6111/5/35
1948 (3) 46105/62/7/54
1949 (6) 46102/6/23/30/43/53
1950 (6) 46100/7/13/36/41/55
1951 (2) 46142/64
1952 (3) 46140/58/65
1953 (4) 46110/34/51/63
1954 (2) 46148/56
1955 (1) 46137

**First of class withdrawn:** 46100 46139 (1962)
**Last of class withdrawn:** 46115 (1966)
**Examples preserved** (Rebuilt state): 46100/15

A publicity pose, with the LMSR 'Royal Scot' exhibition train alongside the Pennsylvania Railroad 'Broadway Limited'. The LMSR train was shipped from Tilbury to Montreal, Canada, and commenced an extensive tour of North American railroads from May 1-25, 1933, afterwards going on show at Chicago in June. Following still further travels it arrived back at Tilbury via Montreal in December, having covered 11,194 miles on American tracks. The engine carried a cowcatcher (not seen in this picture) for some parts of its travels and also the usual American electric headlight, marker lights and warning bell. The new bogie was not fitted with brakes, but the engine retained the crosshead vacuum pump (a feature removed by Stanier in the late 1930s). *[British Rail LM Region*

Stanier made a number of detail changes to the 'Royal Scot', perhaps the most visually obvious being the substitution of new high-sided curved-top 4 000 gallon, 9 ton coal capacity six-wheel tenders. The original Fowler tenders were then attached to new 5XP 'Jubilee' class Stainer 4-6-0s, the tenders built at Crewe for the latter going instead to the 'Royal Scots'; the whole lot being swapped in a short period, 1936-7. No. 6162 *Queen's Westminster Rifleman* was photographed in pre-war days leaving Preston with a stopping train to Manchester. By this time the bogie brakes had been removed; additional lugs had been fixed to the bottom of the smokebox door and the smoke-deflectors had the tops angled inwards.

*[Eric Treacy*

In early BR days, showing the post-war black LMSR livery with maroon and straw edging, but with the engine renumbered 46110. *Grenadier Guardsman* was photographed at Birmingham New Street on an up Wolverhampton to Euston express, and the rear ¾ angle clearly shows the Stanier tenders, with snaphead rivets and high curved-top sides; certainly more in keeping with the size of the engine. By this time the Fowler engines were in considerable trouble with leaky smokeboxes and their boilers and cylinders were due for renewal. Stanier had commenced a drastic rebuilding of the class in 1943, but some engines had general repairs after that date, without rebuilding, and it was not until 1955 that the last of the 70 locomotives was rebuilt. *[P. H. Wells*

Also carrying post-war LMSR livery, but with early BR lettering and number, 46100 *Royal Scot* showing her final condition prior to rebuilding by Stanier. The special nameplate was retained on the smokebox door, also the bell (non-operative), together with the specially inscribed nameplates giving details of the American tour of 1933. The smoke-deflectors are of the later curved-top variety, inset at the lower edge to provide a footstep on the running-plate. No. 46100 was rebuilt with taper-boiler in 1950 and finally withdrawn for preservation in 1962, by which time she had run a total of 2,141,229 miles. Photographed leaving Chester with a Holyhead train. *[Eric Treacy*

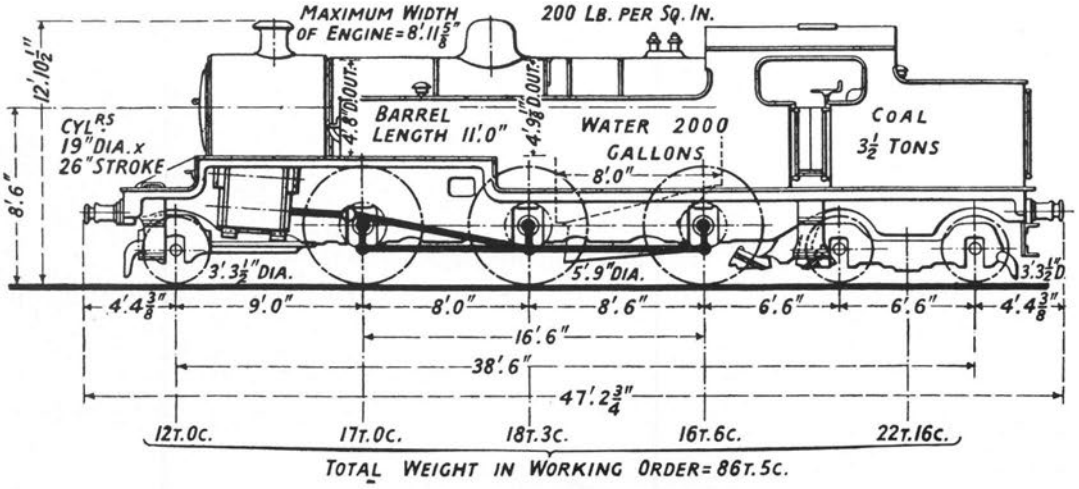
Two unrebuilt 'Royal Scots' at Euston Station in 1951 ; No. 46151 *The Royal Horse Guardsman,* with No. 46134 *The Cheshire Regiment* in the background. Twenty-eight of the class remained to be converted when the railways were nationalised in January 1948, and the last of the class to run with a Fowler parallel boiler was No. 46137 *The Prince of Wales' Volunteers* (*South Lancashire*) which was rebuilt in March 1955. *[P. H. Wells*

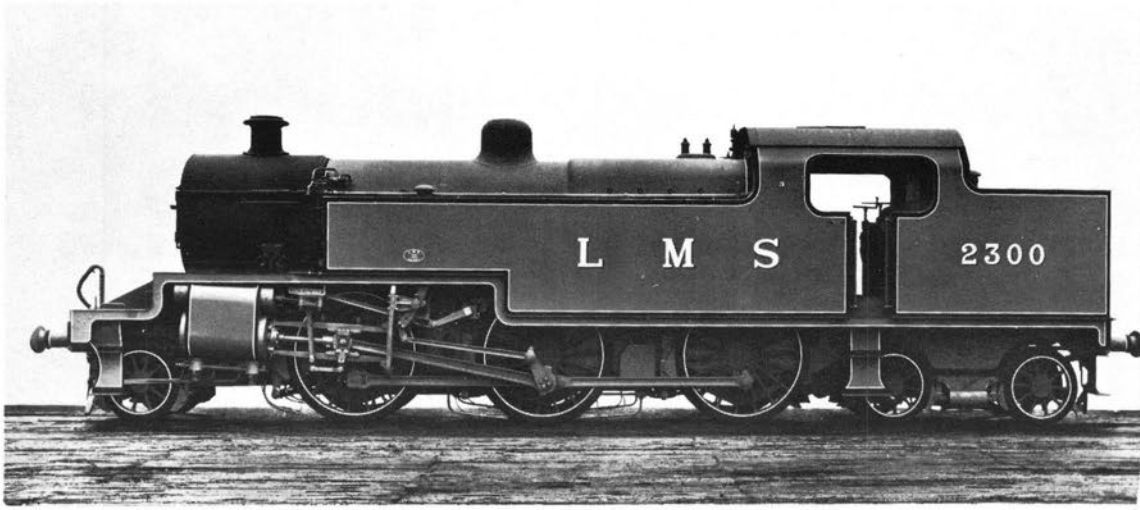
## Section: 9 2-6-4T Class 4P
## Passenger Tank Engines
Introduced: 1927 Total: 125

The need for a powerful medium sized tank engine with general purpose characteristics, suitable for widespread use on the LMSR system, had been realised by George Hughes, who gave some consideration to a 2-6-4T version of his mixed-traffic Horwich 2-6-0; his own large Baltic 4-6-4T class not being suitable. By the time Fowler was requested to give the matter his serious attention (as the Operating Department's need for such an engine had become pressing) the use of a higher boiler pressure and the relaxation of certain loading gauge restrictions made it no longer necessary to employ the large, steeply inclined outside cylinder arrangement of the Hughes engine, and a completely new 2-6-4T design was drawn-up at Derby in 1926-27. Nevertheless some Horwich influence made itself felt in the provision of generous size axleboxes and in the design of the cylinders and valve gear.

The two outside cylinders of new design were 19in diameter by 26in stroke, with straight ports, adequate size piston valves and long-lap Walschaerts valve gear. The motion details were based upon the SDJR 2-8-0s but with some influence from the Horwich 2-6-0s. The driving wheels, of 5ft 9in diameter, were spaced on the usual Derby 8ft plus 8ft 6in standard wheelbase.

The boiler for the new class was in fact a superheated version (G8AS) of a 1902 MR boiler design used for the class 3 4-4-0s. With a boiler pressure of 200 lb per sq in, the total evaporative heating surface was 1 220.5 sq ft with the tubes providing 1 082.5 sq ft and the firebox 137.55 sq ft. The superheater gave 266.25 sq ft. Tractive effort at 85 per cent boiler pressure was



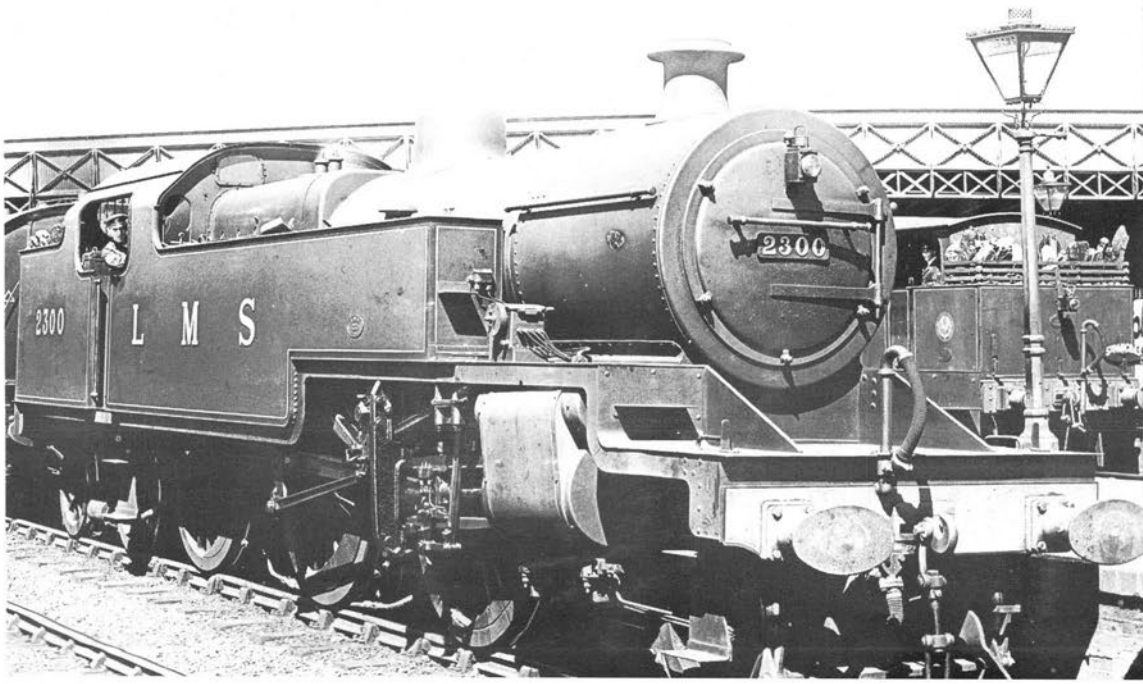



In works grey livery, No. 2300, first of the class, is seen in this official broadside photograph. The engine carried the power classification 3 on the cabside; this was changed to 4. The pony truck and bogie are both fitted with brakes, and the engine is fitted with water pick-up apparatus.

*[British Rail LM Region*

No. 2300 seen here in service on a St. Pancras suburban train, in original condition and in Crimson Lake passenger engine livery; photographed at St. Albans. Over half the first 25 locomotives of the class were at first painted in Crimson Lake livery, but the remainder of the class were delivered in black, with red lining-out. No. 2313 carried the name *The Prince* painted on the tank sides for a number of years, in honour of the visit of the Prince of Wales (later the Duke of Windsor) to Derby works in February 1928, when the engine was nearing completion.

*[Locomotive Publishing Company*



23 125 lb. Weight in full working order was 86 tons 5 cwt. When new the engines were fitted with bogie brakes and cylinder by-pass valves; later removed by Stanier.

The engines were built as follows:

| | | |
|---|---|---|
| Nos 2300-2303 | Derby | 1927 |
| Nos 2304-2324 | Derby | 1928 |
| Nos 2325-2374 | Derby | 1929 |
| Nos 2375-2384 | Derby | 1932 |
| Nos 2385-2423 | Derby | 1933 |
| No 2424 | Derby | 1934 |

This class, with well designed front end and good bearing surfaces, proved immediately to be highly successful in everyday service. Speeds in excess of 80 m.p.h. were recorded on outer-London suburban trains, and in view of this it is interesting to record that Fowler asked Sir John Pringle, then Inspecting Officer Ministry of Transport, about the desirability or otherwise of using the 2-6-4T wheel arrangement, following the 1927 Sevenoaks disaster when an SR River class tank engine with the same wheel arrangement became derailed at high speed. He was advised that the layout would be quite suitable provided it was not to be employed for high speed workings!

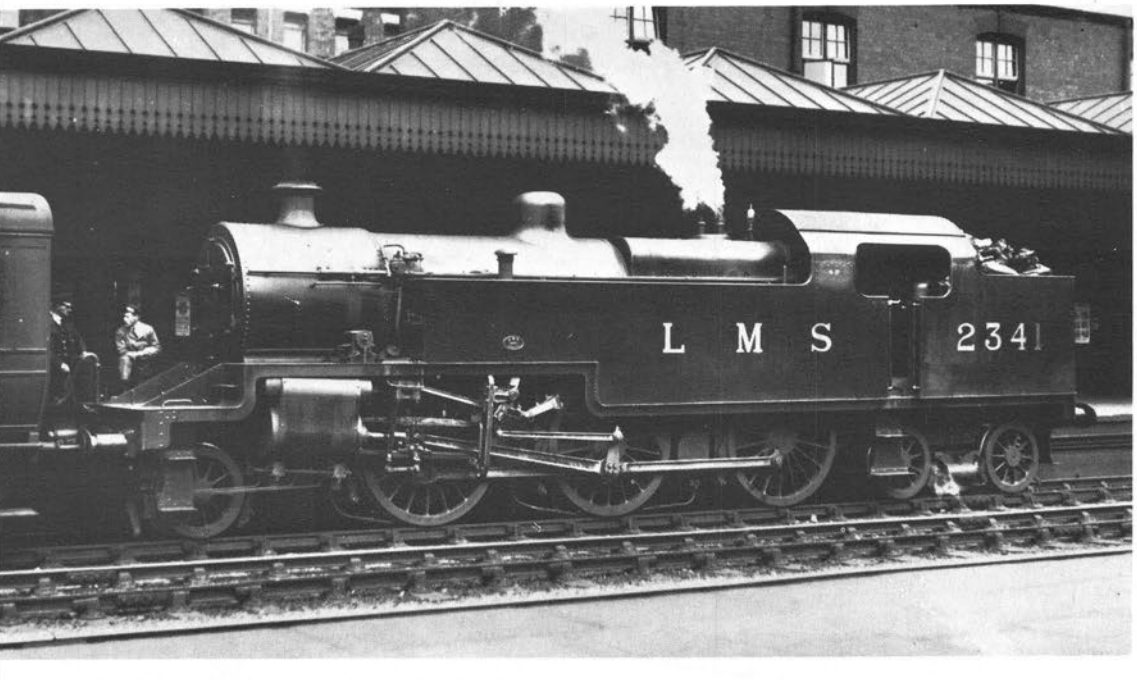
Stanier perpetuated the 2-6-4T design, substituting his own taper-boiler, and on the first engines employing three cylinders instead of two. When the three-cylinder arrangement demonstrated no advantage in terms of speed or acceleration over the Fowler class he quickly reverted to the two-cylinder layout. Prior to producing his own taper-boiler version he made some modifications to the final batches of the Fowler engines; in particular side-window cabs on Nos 2395-2424, and improved bogies.

**First of class withdrawn:** 42308 (1959)
**Last of class withdrawn:** 42410 (1966)
**None preserved**

No. 2341, photographed at Nottingham in 1930 in black livery, with the power classification 4P painted on the cabside. Front tank vents raised in height; bogie and pony truck brakes still *in situ*.

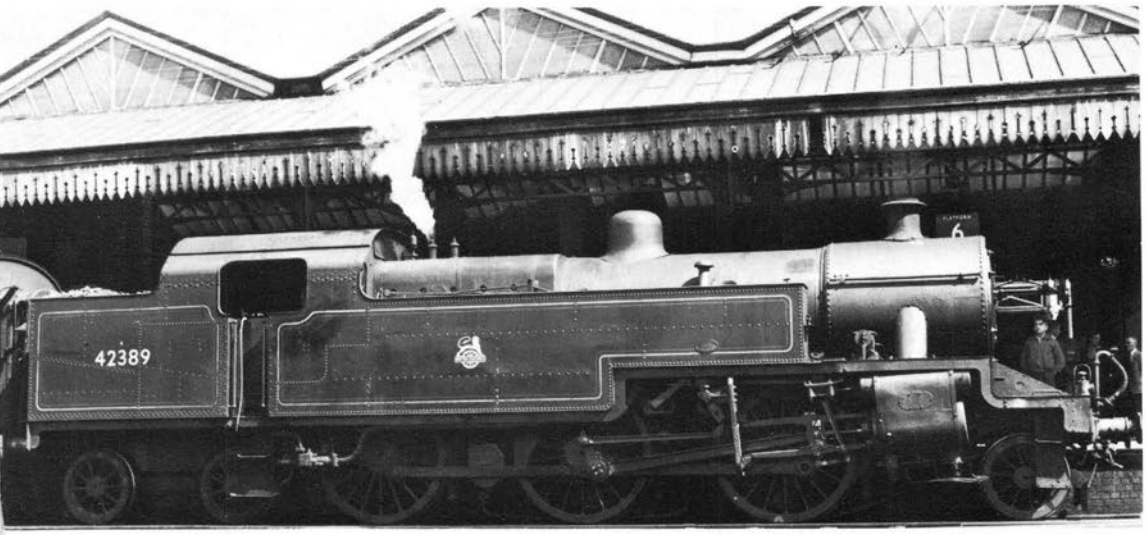
Steam-heating hoses were supplied at front and rear of these locos, to permit train-heating without the need to turn the locomotive.

*[P. Ransome-Wallis*

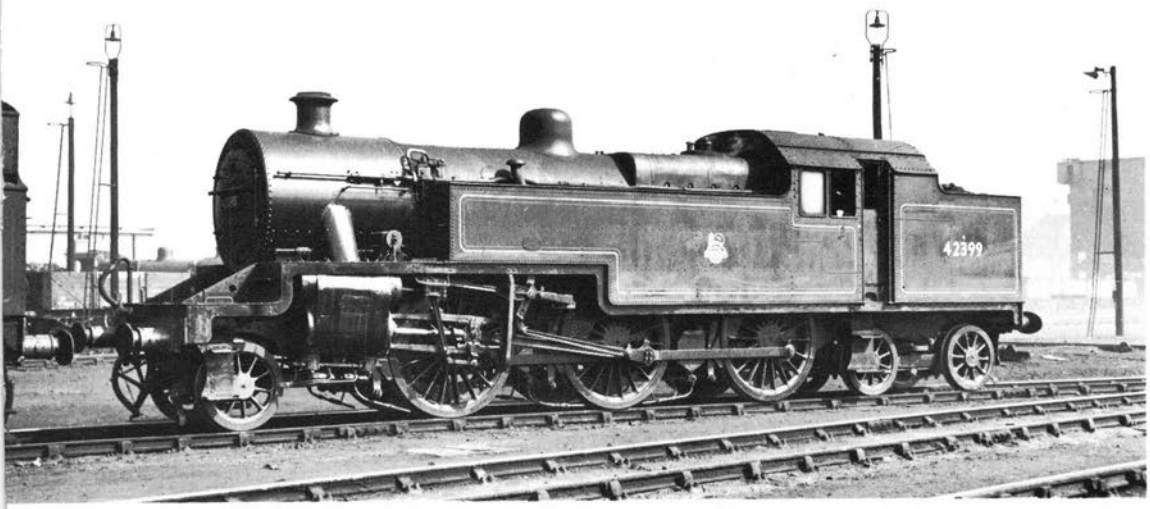


The final batch of Fowler 4P 2-6-4Ts was built at Derby in 1934, when Stanier was in charge, and a number of alterations appeared after only 10 (Nos. 2385-2394) had been built. The remaining locos, Nos. 2395-2424 were built with side-window cabs; improved bogie, and flat side rods. Stanier followed these with the first of his new taper-boiler 3-cyl. 2-6-4Ts which had a similar cab design, complete with full-length side door. No. 2424, last of the Fowler locos to be built, is seen banking a northbound freight on Shap. The engine has acquired a Stanier chimney. *[Eric Treacy*

Class 4P 2-6-4T No. 42322 photographed at Penrith working the up Keswick portion of the 'Lakes Express' in July 1963. The front end has been modified, with outside steampipes and a Stanier chimney. *[Derek Cross*




A view of a Fowler 2-6-4T which emphasises the length of the engine; No. 42389, seen at Stafford after arrival on a Shrewsbury train, was one of the 1934 batch and shows the liberal use of snap-head rivets that Stanier permitted in favour of the flush sided finish of the earlier Fowler batches. The engine also shows the modified rear cutaway to the cab side. The distance between the entrance and the rear cutaway was considerably reduced, probably to lessen draughts when running bunker-first. The locomotive has been modified with outside steampipes and has flat side rods and a Stanier chimney. *[J. B. Bucknall*

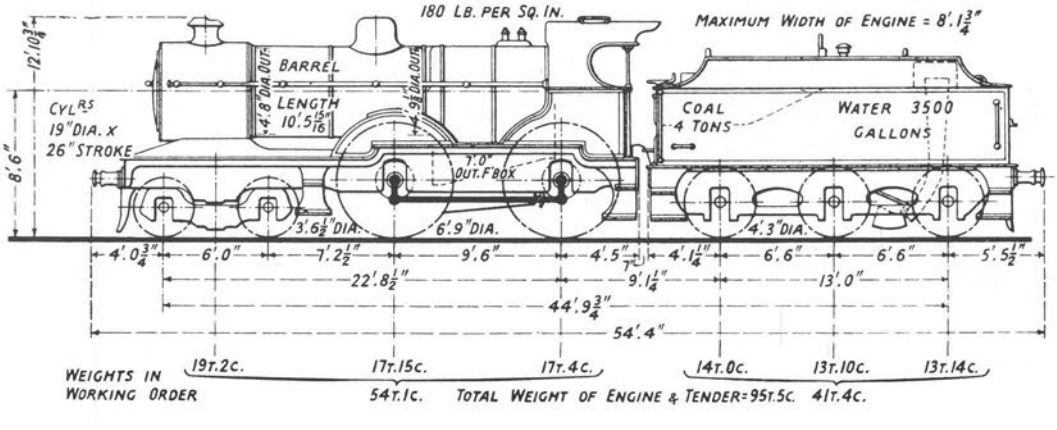


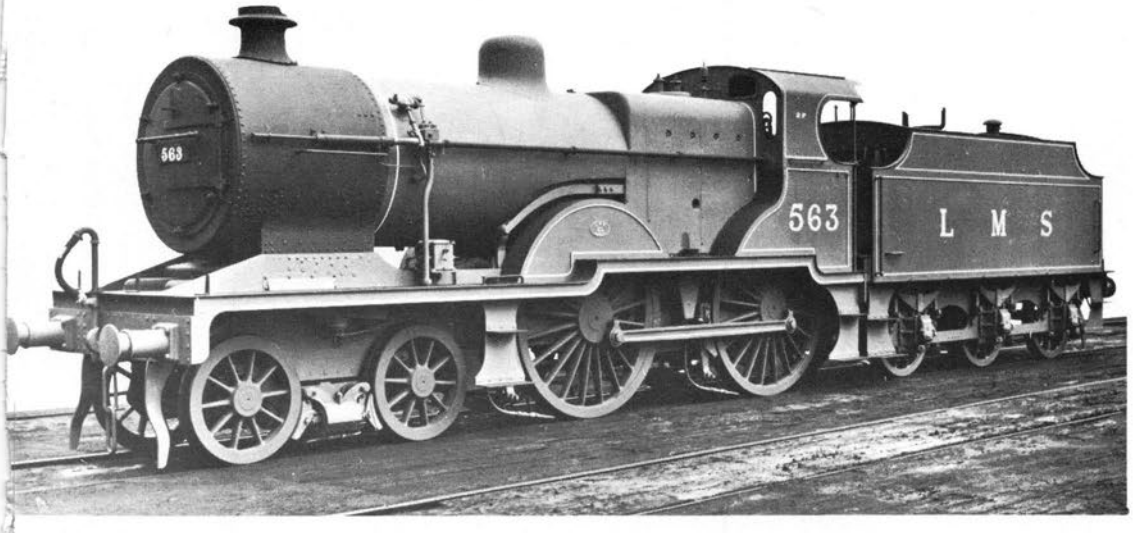

No. 42399 of the final side-window cab batch, seen in BR days, with outside steampipes, Stanier chimney and flat side rods. The engine does not appear to carry the water pick-up gear which was a feature of the earlier Fowler batches. Photographed at Derby in April 1958. This final batch was never fitted with bogie brakes. *[P. H. Groom*

## Section: 10 4-4-0 Class 2P
## Light Passenger Engines
Introduced: 1928 Total: 138

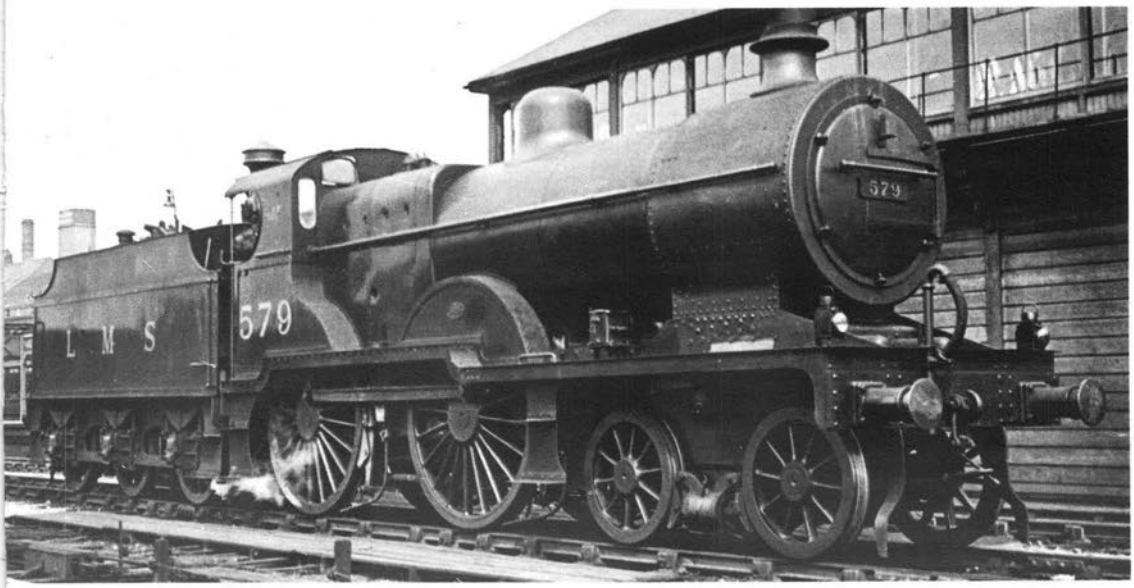
A new series of standard class 2 4-4-0 passenger engines, based upon the former MR engines as progressively rebuilt by Fowler, was at first envisaged with outside cylinders. Derby acknowledged that the performance of the earlier locomotives was poor by contemporary standards and they realised that the main weakness lay in the poor design of the two inside cylinders. As a remedy two outside cylinders were proposed, with inside Stephenson valve gear, but loading gauge problems on some secondary routes were the probable reason for a decision to revert to a redesigned inside cylinder layout, with improved ports and passages. The valves remained in their original position, underneath the cylinders, which had the diameter reduced from 20in to 19in; the stroke remained the same at 26in. The Stephenson valve gear was left unaltered, with short travel valves, but later engines of the class were fitted with double exhaust valves.

The G7S boiler pressure was increased from 160 to 180 lb per sq in and Ross pop safety valves were fitted. The 7ft $0\frac{1}{2}$in diameter driving wheels of the rebuilt MR engines was reduced to 6ft 9in for the new standard class. The evaporative total heating surface was 1 157.5 sq ft, with the large and small tubes providing 1 033.7 sq ft and the firebox 123.8 sq ft. The superheater gave 252.7 sq. ft. Tractive effort at 85 per cent boiler pressure was 17 729 lb. The engine weighed 54 tons 1 cwt 2 qtr in full working order and the standard Fowler six-wheeled 3 500 gallon tender weighed 41 tons 4 cwt, giving a total locomotive weight of 95 tons






First locomotive of the series, No. 563 seen in works grey livery, the class were actually delivered in LMSR black with red lining. The overall appearance closely followed that of Fowler's rebuilt 483 class 4-4-0s. Bogie brakes and Fowler by-pass valves were fitted when new. All the engines had left-hand drive and their overall dimensions were suitable for operation over most parts of the LMSR system. *[British Rail LM Region*




No. 579 of the first batch, built at Derby in 1928, and seen in original condition at Nottingham Midland. No steam-heating provision on front bufferbeam. *[T. G. Hepburn*

Class 2P 4-4-0 No. 644 makes a pretty sight on a Kilmarnock train at Mauchline in 1936. Steam-heating hose provided on front bufferbeam; the piston tail rod guides are clearly visible at the front end between the frames. No. 644 was one of a batch built at Crewe in 1931. *[F. R. Hebron*

5 cwt 2 qtr. When new the locomotives were fitted with bogie brakes and by-pass valves; removed during the Stanier regime.

The engines were built as follows:

| | | |
|---|---|---|
| Nos 563-612 (a) (c) | Derby | 1928 |
| Nos 575/6/80 (b) | Derby | 1929 |
| Nos 613-628 | Derby | 1929 |
| Nos 629-632 | Derby | 1930 |
| Nos 636-660 | Crewe | 1931 |
| Nos 661-665 | Derby | 1931 |
| Nos 666-685 | Derby | 1932 |
| Nos 686-700 | Crewe | 1932 |

(a) Nos 575/6/80 were transferred to SDJR stock in 1928, becoming their Nos 44-46. On return to LMSR stock in 1930 they were renumbered LMSR Nos 633-635.

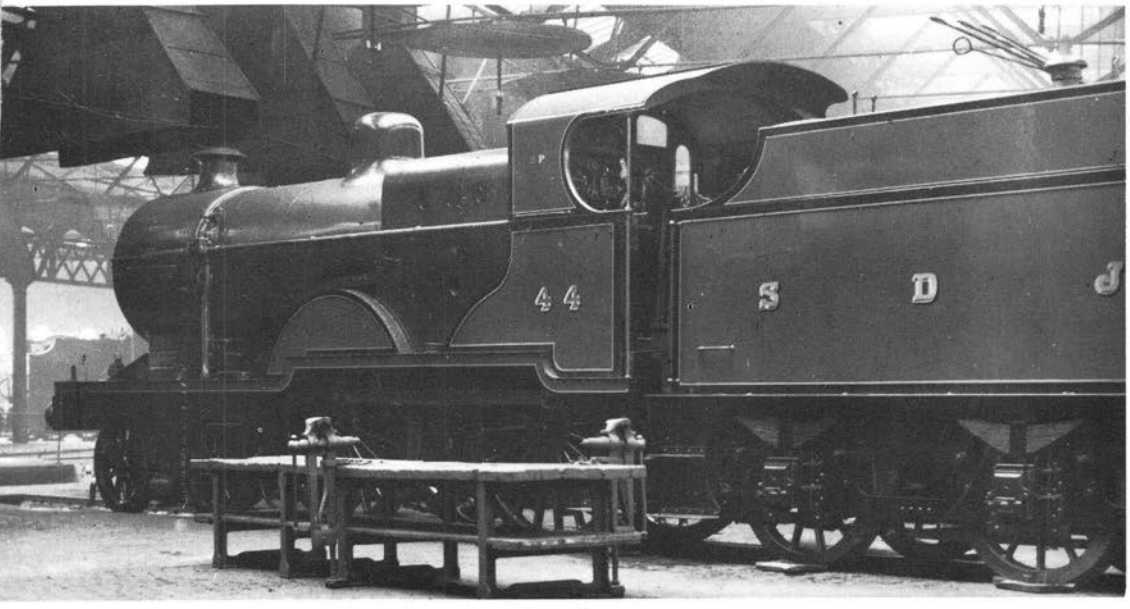
(b) New locomotives built to replace Nos 575/6/80 transferred to SDJR.

(c) No. 572 was experimentally fitted with double-port exhaust valves and was re-numbered 601. A second locomotive was built and filled the vacant No. 572.

These engines never shone in terms of performance on the road, but their robust and simple construction, related to their normally light secondary duties, gave them the lowest average repair cost in pence per mile of any LMSR passenger type.

Two of the class had very short lives; Nos 591 and 639 were broken-up in 1934 following a collision in Scotland.

**First of class withdrawn:** 591/639 (1934)
**Last of class withdrawn:** 40670 (1962)
**None preserved**



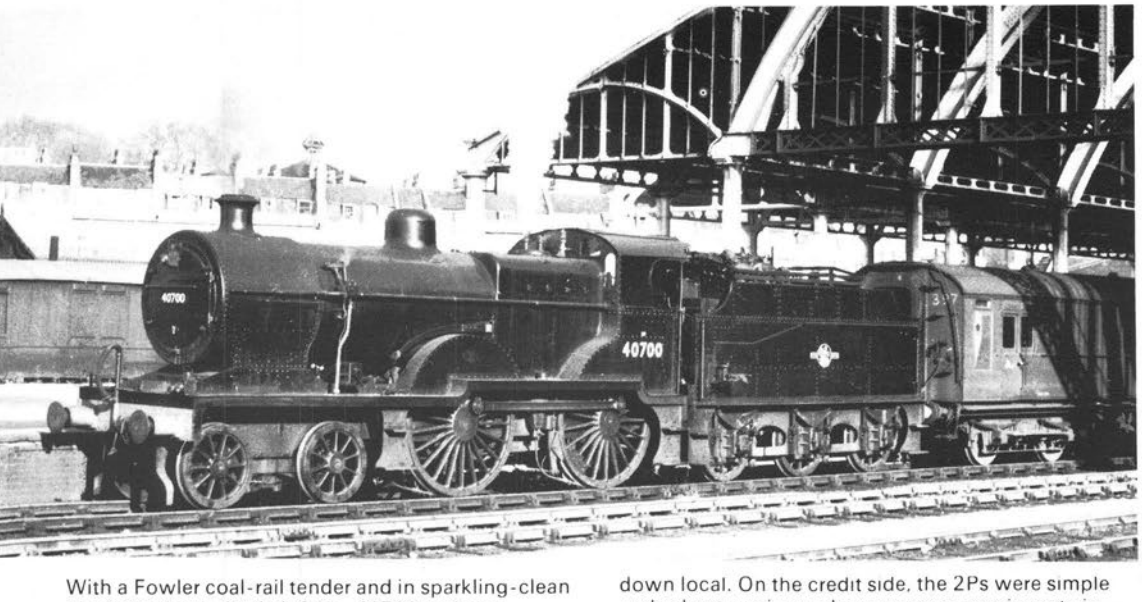

Three of the 2P 4-4-0s built for the LMSR at Derby in 1928 were transferred to the Somerset and Dorset Joint Railway stock the same year. These were LMSR Nos. 575/6/80 which became SDJR Nos. 44-46 respectively. They were painted in the blue livery of the Joint line, as seen here on No. 44 photographed inside Derby shed in June 1928. When the LMSR took the SDJR locomotives into stock in 1930 these three locomotives became Nos. 633-35. In 1929 Derby built three more locomotives, Nos. 575/6/80, to replace the three sent to the SDJR. *[H. C. Casserley*

In 1933 two class 2P 4-4-0s were experimentally fitted with Dabeg feed water heaters. These were No. 633 and No. 653. The former was one of the three ex-SDJR locomotives, returned to LMSR stock. The latter locomotive is seen here at Crewe in 1935; a tall version of the Fowler chimney had been fitted, and there were no bogie brakes.
*[Photomatic*

*Above:* The 2Ps were an indifferent class, due to poor front end layout, and they performed best on light secondary duties, as seen here, with No. 40610 working an Ayr to Dalmellington train past Dalrymple Junction in July 1958. A Stanier chimney had been fitted but otherwise very little change was made to the appearance of these engines throughout their somewhat undistinguished careers. *[Derek Cross*

*Left:* Double-heading was one frequent use for the 2P 4-4-0s, especially on the former SDJR line. No. 40634 (originally LMSR No. 576; SDJR No. 45 and LMSR No. 634) is seen double-heading Stanier 'Black Five' 4-6-0 No. 44839 out of Bath on the down 'Pines Express' in February 1950. Tablet apparatus on tender; Stanier chimney; no front steam-heating provision. *[Ivo Peters*

Shades of the 'Night Ferry' ! Unfortunately the Fowler 2P 4-4-0s in no way matched-up to the very similar looking Maunsell rebuilds on the SR, because the front end layout adhered to out-dated MR practice whereas the SR engines had an excellent modern front end arrangement. Fowler 2P 4-4-0 No. 40563 (first of the class) makes a fine sight as she double-heads SR Pacific No. 34044 *Woolacombe* on the 11 coach southbound 'Pines Express' up Devonshire Bank, on the climb from Bath; October 9, 1953. *[G. F. Heiron*

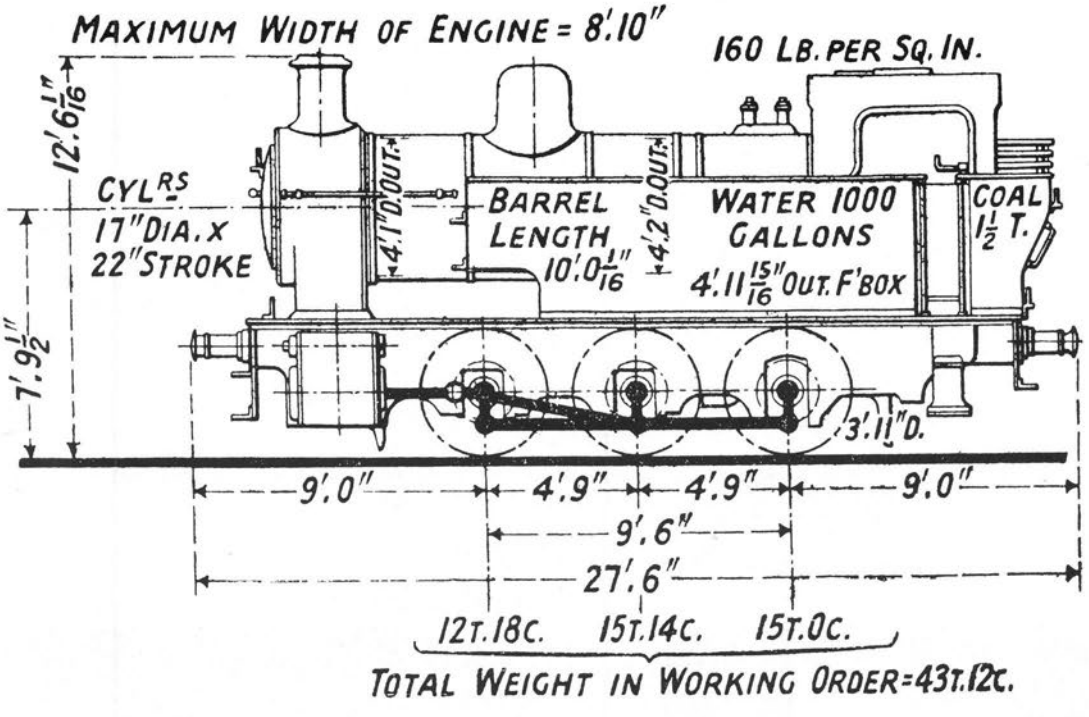


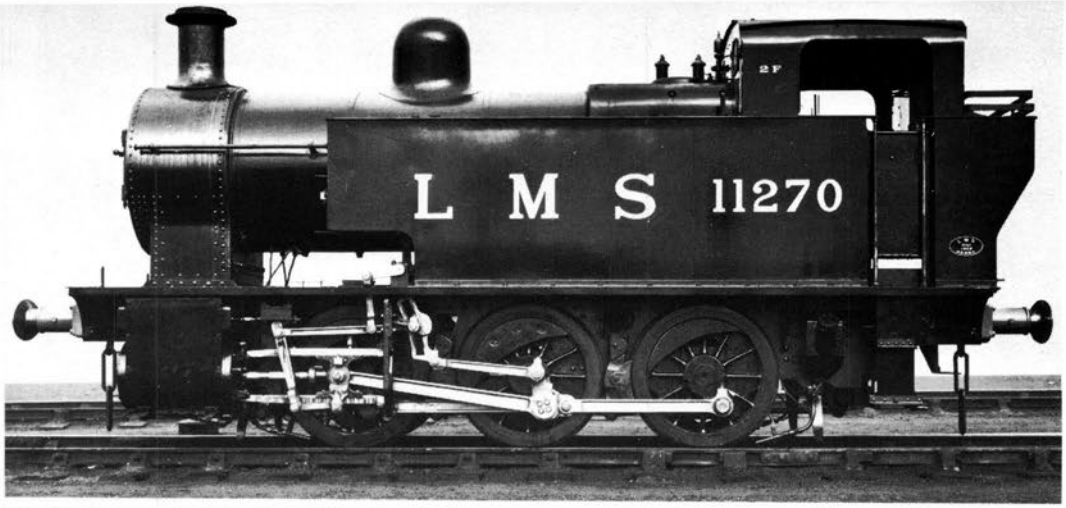

With a Fowler coal-rail tender and in sparkling-clean black BR livery, 2P 4-4-0 No. 40700 makes a pleasing sight; about to leave Bath on the 1.10 pm down local. On the credit side, the 2Ps were simple and robust engines whose average repair costs in pence per mile were remarkably low. *[Ivo Peters*

## Section: 11 0-6-0T Class 2F
## Dock Tanks
Introduced: 1928 Total: 10

These attractive little machines were designed specifically for dockyards and depots where very tight radius curves existed, and they had a very short coupled wheelbase of 9ft 6in (equally divided). The design was prepared at Horwich under the supervision of T. F. Coleman, but a number of features including the cab, bunker and boiler mountings were very similar to the Derby 3F 0-6-0Ts in appearance.

Two outside cylinders were provided, with 17in diameter by 22in stroke; outside Walschaerts valve gear drove on to the centre axle. The wheel diameter was only 3ft 11in and there was an overhang of 9ft on each side of the driving wheels. The boiler, which was a saturated G5 type, had the pressure set at 160 lb per sq in, and a total heating surface of 1 008 sq ft; consisting of a tube heating surface of 923 sq ft and a firebox heating surface of 85 sq ft. Tractive effort at 85 per cent boiler pressure was 18 400 lb. The weight in working order was 43 tons 12 cwt, with the three axles carrying the






Official photograph of the first of the class, in the black livery they always carried, with varying insignia. The boiler was high-pitched and the wheelbase very short, but they were curiously attractive little machines, with a capable air about them. When new, five were sent to Scotland and the remainder to Birkenhead and Fleetwood.

*[British Rail LM Region*

weight as follows: leading, 12 tons 18 cwt; intermediate driving, 15 tons 14 cwt; and trailing, 15 tons 0 cwt.

The engines were built as follows:

| | | |
|---|---|---|
| Nos 11270-11276 | Derby | 1928 |
| Nos 11277-11279 | Derby | 1929 |

The class was renumbered in 1934, becoming Nos 7100-7109 and again in 1939, becoming Nos 7160-7169; finally becoming Nos 47160-47169 in the 1948 BR renumbering scheme.

**First of class withdrawn:** 47169 (1959)
**Last of class withdrawn:** 47165 (1964)
**None preserved**

In 1934 the ten engines were renumbered 7100-09, but these numbers were required for a batch of diesel-electric shunters and in 1939 a further renumbering took place; the engines becoming Nos. 7160-69. The LMSR regarded this class as a standard design, and consideration was given to building further engines of the class in later years. No. 7169 was photographed complete with smokebox adornment, at Greenock in October, 1946.

*[H. C. Casserley*

Class 2F 0-6-0T No. 47162 photographed on shed at Edinburgh St. Margarets in July 1953. No vacuum brake was fitted to these engines and a plain three-link coupling sufficed for their duties as a rule, but this example had acquired a screw coupling when the picture was taken. *[P H. Wells*

Bunker end view of 2F 0-6-0T No. 47167, taken at Greenock in July 1958. The bunker has had three extra coal rails attached to increase fuel capacity. These locomotives were elusive and camera-shy, spending most of their time in dockyards and rather inaccessible parts of the LMSR system. Most of the photographs which exist show them on shed'.

*[P. J. Sharpe*

## Section: 12 4-6-0 Class 6 Experimental High-Pressure Engine

Introduced: 1930 Total: 1

**Fury**

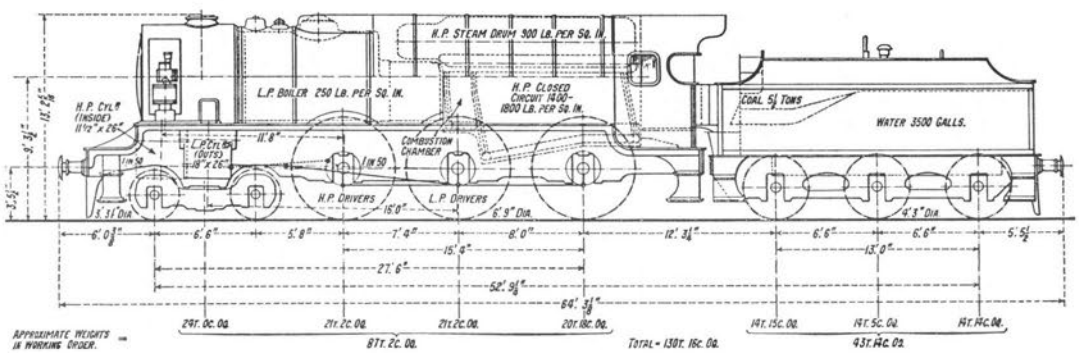
In 1929 an attempt was made to obtain an improved thermal efficiency for an express passenger engine of comparable size and power to the new Royal Scots. This was to be done by means of an ultra high pressure boiler, of German Schmidt-Henschel design, sponsored in Britain by the Superheater Company. A 4-6-0 locomotive was ordered from the North British Locomotive Company, using the same chassis, bogie, tender and wheelbase arrangement as the Royal Scot design, but fitted with the Schmidt-Henschel triple-pressure boiler.

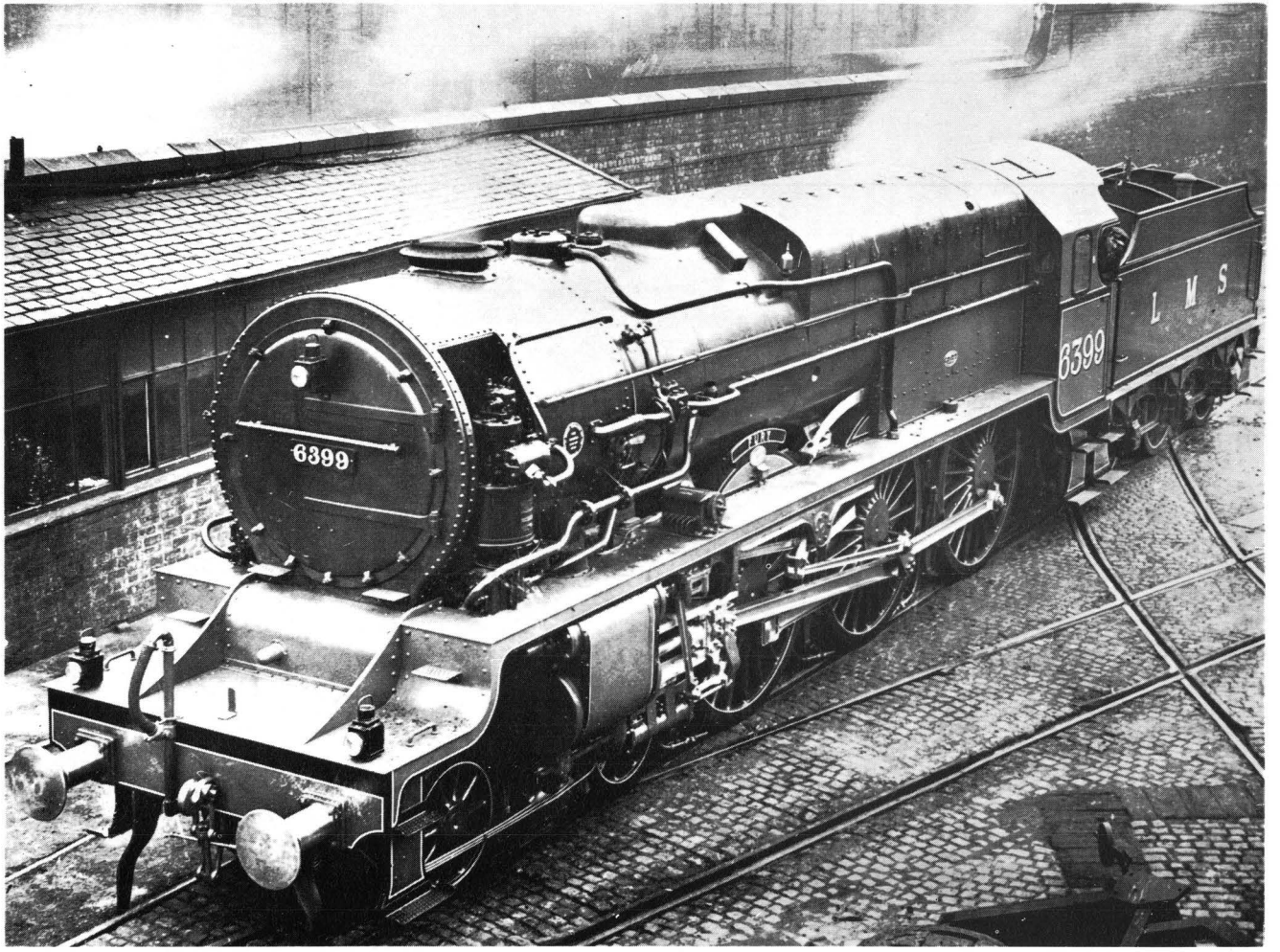
The arrangement of the boiler was complex indeed, with three units generating steam at 1 400, 900 and 250 lb per sq in respectively. The firebox water-tubes were under 1 400 lb pressure and the distilled water was contained in a closed circuit. The heat from this circuit generated steam at 900 lb in the second circuit, which held about 1 $\frac{1}{2}$ tons of water. This steam was fed direct to the inside high pressure cylinder, which was of 11 $\frac{1}{2}$in diameter by 26in stroke. Exhaust from this cylinder was mixed with steam at 250 lb pressure, produced in the ordinary fire tube portion of the barrel in the forward part of the boiler, and was then fed to the two outside low pressure cylinders of 18in diameter by 26in stroke. The nominal tractive effort was the same as a Royal Scot 4-6-0 and the engine was likewise classified 6. A standard Fowler tender was fitted, but the total weight was greater than a Royal Scot because the engine portion weighed 89.55 tons in full working order; some five tons more than a 'Scot'.

The locomotive was given the running number 6399 and took the name *Fury*, previously carried by Royal Scot 4-6-0 No. 6138. The engine was built as follows:

No. 6399 North British 1929

Experimental runs were made in the Glasgow area during the first weeks of 1930, and on February 10, whilst near Carstairs on a trial run, a firebox super-pressure tube burst, killing one man and seriously injuring another. This was the most serious of a number of troubles which plagued the


H.P. STEAM DRUM 900 Lb. PER SQ. IN.
L.P. BOILER 250 Lb. PER SQ. IN.
H.P. CLOSED CIRCUIT 1400-1800 Lb. PER SQ. IN.
COMBUSTION CHAMBER
H.P. DRIVERS
L.P. DRIVERS
COAL 5½ TONS
WATER 3500 GALLS.
APPROXIMATE WEIGHTS IN WORKING ORDER.
87T. 2C. 0Q.
TOTAL = 130T. 16C. 0Q.
43T. 14C. 0Q.




In steam at North British, and with the outline-engraved brass oval plaque *in situ* below the nameplate, No. 6399 *Fury* photographed in January 1930. The first trial run was over LNER tracks at Springburn and it ran further trials in the Glasgow area for about three weeks until February 10, 1930 when a firebox super-pressure tube burst whilst the locomotive was at Carstairs. The explosion killed the Superheater Co's inspector and seriously injured the fireman; both the driver and LMSR inspector escaped with shock.

*[British Rail LM Region*

engine, and it never ran in revenue-earning service. Following this explosion, which was the subject of an enquiry, the engine was repaired and sent to Derby for examination. It rested, out-of-use, in the paint shop at Derby works until July 1934, when on Stanier's instructions it was satisfactorily steamed in his presence. The coal consumption was considered to be high, and Stanier recommended that the experiment should be abandoned, and that the locomotive should be rebuilt as a conventional 4-6-0. A sum of £3 000 was paid to the Superheater Company in November 1934 in settlement of their interest in the abortive venture. It would be timely to recall here that similar experiments with ultra high pressure boilers in France, Canada and elsewhere also ended in abandonment.

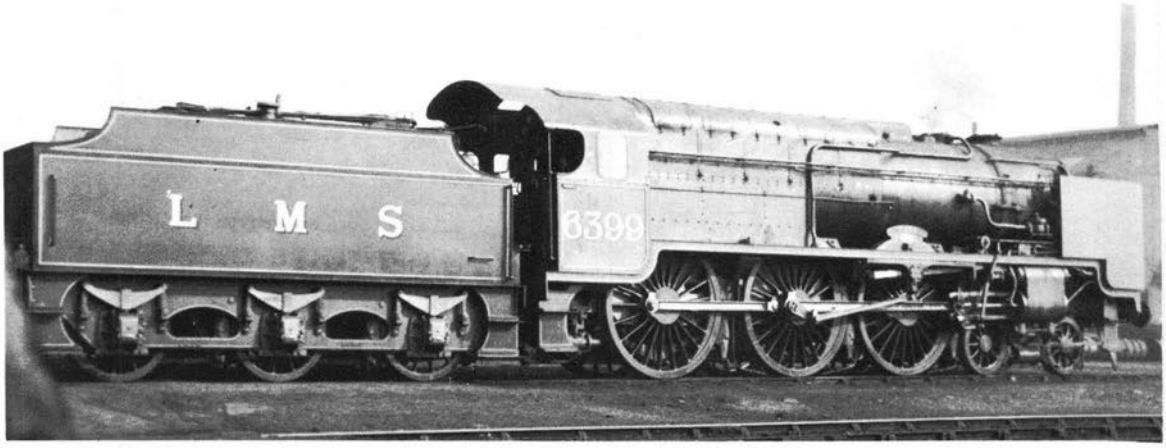
No. 6399 was rebuilt with a new Stanier taper-boiler and conventional three-cylinder layout; the work being done at Crewe in 1935. In this new form it was in many respects the prototype for the later rebuilding of the Fowler Royal Scot class (see page 77). A description of the rebuilt engine, which was renumbered 6170 and named *British Legion,* is given in section 10, page 84 of *Stanier Locomotives.*

The locomotive was never taken into LMSR stock in its original form.

**Withdrawn:** 1962 (As 46170; rebuilt state)

Experimental 4-6-0 Class 6 No. 6399 *Fury* with Schmidt-Henschel high pressure boiler, built by the North British Locomotive Company in December 1929, and seen in works grey livery. The Superheater Co. sponsored this project, which was similar to experiments pursued in France and Canada as well as Germany. The engine had basically the same bogie (fitted with brakes); chassis; tender and coupled wheelbase dimensions as the Fowler 'Royal Scot' class 4-6-0s. The shape of the main frames ahead of the smokebox door was, however, quite different to that of the 'Scots'. This photograph was taken prior to fitting the brass plaque below the nameplate and prior to the bufferbeam being lined out.

*[British Rail LM Region*




No. 6399 seen here fitted with indicator shelters on the front end. Following the fatal explosion at Carstairs, the locomotive was the subject of much investigation and the boiler was partially rebuilt. But there were too many inbuilt design weaknesses, and the engine never entered revenue-earning service. The arrangement of the boiler feed, which had to deliver water against the very high pressure, would not permit a reliable water level to be maintained. *[Stanley J. Rhodes*

With the indicator shelters removed, but still rigged-up for testing, at the front end, No. 6399 *Fury* was photographed laid aside at Derby, in the paint shop where it languished for a considerable period before Stanier had it steamed-up in his presence and finally pronounced further experimentation as worthless. He proceeded to rebuild the locomotive, with all the hallmarks of his new fleet of LMSR standard engines, and the resurrected machine entered traffic in 1935.

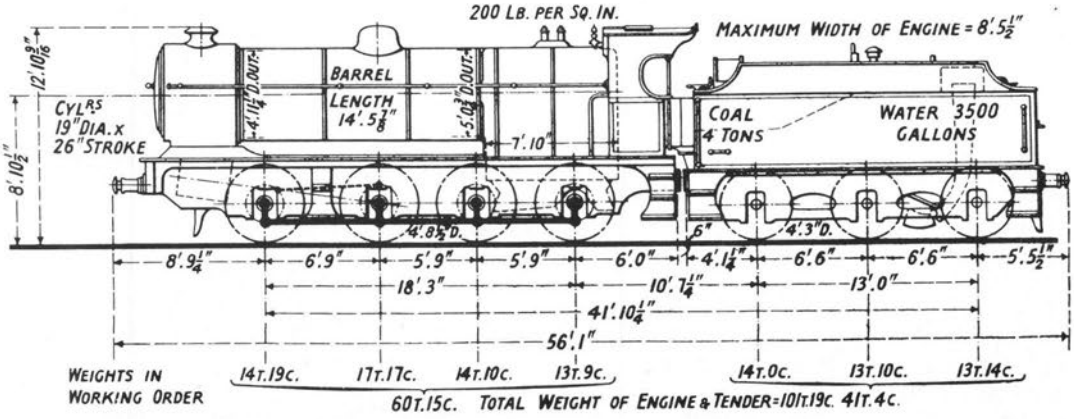
## Section: 13 0-8-0 Class 7F
## Mineral Engines
Introduced: 1929 Total: 175

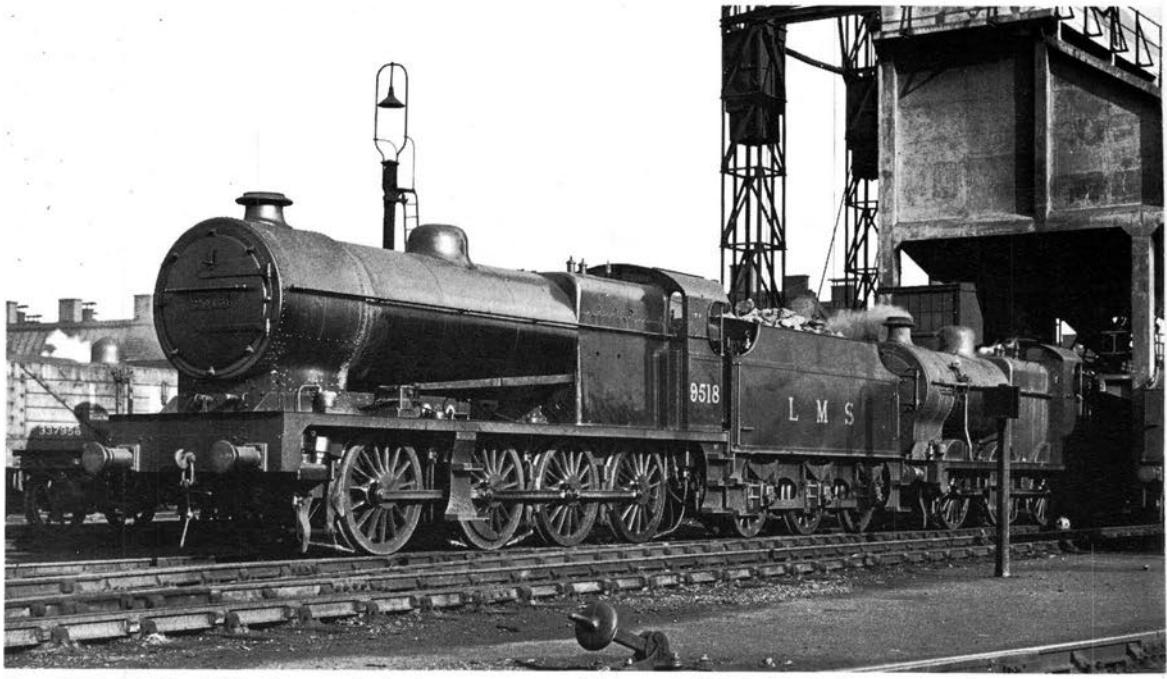
Although the introduction of the Beyer-Garratts had eased the double-heading problem on the Midland line, scope still remained in the everyday LMSR traffic requirements for a new standard mineral engine somewhat larger than the class 4F 0-6-0s. The basic dimensions of the ex LNWR class G1 and G2 0-8-0s of Bowen Cooke's design seemed to fit the bill admirably, and unlike the large passenger engines of Crewe origin, these locomotives showed themselves in no way inferior, when compared with Derby products. Accordingly the LMSR authorities agreed to standardise an 'improved' version for new construction. This retained the Crewe boiler (with a 20 lb increase in pressure) but had a re-designed chassis with new, smaller, cylinders; inside long travel Walschaerts valve gear and 3in larger wheels.

The G7¾S type boiler was very similar to that of the LNWR Belpaire G2 engines, but the working pressure was increased to 200 lb per sq in, with two Ross pop safety valves. The tube heating surface was 1 434 sq ft and the firebox heating surface was 150 sq ft. The superheater heating surface was 352 sq ft. The boiler was fed by one live steam and one exhaust steam injector.

The two inside cylinders were 19in diameter by 26in stroke (later increased to 19½in by 26in) and they were inclined steeply downwards to drive the second coupled axle, which carried an axleload of 17.85 tons. Tractive effort at 85 per cent of the boiler pressure was 29 747 lb. The 4ft 8½in diameter driving wheels were spaced 6ft 9in plus 5ft 9in plus 5ft 9in; making a coupled wheelbase of 18ft 3in. Total weight of the locomotive in working order was 101.95 tons, comprising an engine weight of 60.75 tons, and a tender weight of 41.2 tons in full working order.

The overall appearance was entirely Derby






Class 7F 0-8-0 No. 9518 photographed when new, at Crewe South shed. This class of inside-cylinder 0-8-0 mineral engine was the final development of the type in Britain. The boiler was based upon that of the ex LNWR class G2 0-8-0s and was classified type G7$\frac{3}{4}$. *[F. R. Hebron*

Class 7F 0-8-0 No. 9623, photographed leaving Nottingham on an up Wellingborough coal train. None of the class was vacuum fitted. *[T. G. Hepburn*

inspired, with the usual range of Fowler details; the running plate was raised clear of the wheels, avoiding the need for splashers but creating a rather deep buffer-beam at the front end of the engine, and a rather high step up to the footplate at the rear.

The redesigned front end with improved steam distribution proved to be a really excellent layout and, when compared to the LNWR G2 design, an immediate 30 per cent reduction in coal per drawbar horse-power hour was established by tests. But this improvement was tragically married to under-sized bearings; the inadequate class 4F axleboxes being used yet again. As in the case of the Beyer-Garratts ( page 69 ) this proved to be a real Achilles heel to the performance of the new class, and low mileages were run between repairs as a direct result.

The engines were built as follows:

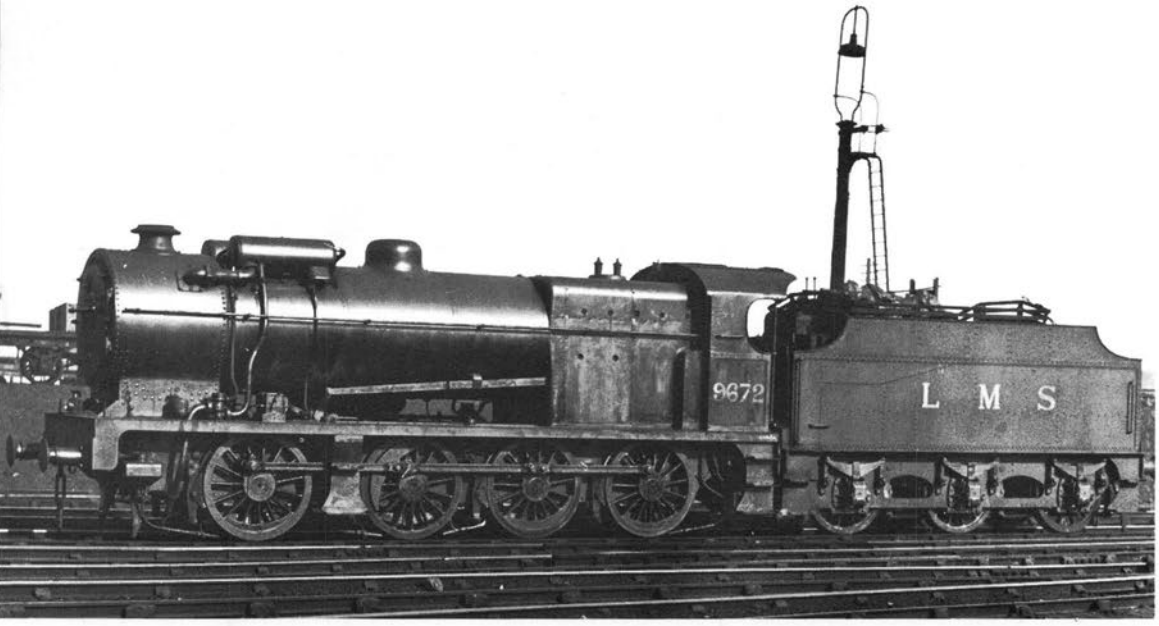
| | | |
|---|---|---|
| Nos 9500-9599 | Crewe | 1929 |
| Nos 9600-9602 | Crewe | 1930 |
| Nos 9603-9634 | Crewe | 1931 |
| Nos 9635-9674 | Crewe | 1932 |

A further five locomotives were included in the 1932 order, but these were cancelled by William Stanier, the new CME, and replaced by an order for prototype 2-8-0 locomotives which eventually materialised as Nos 8000-8001 of the 1935 Crewe-built class 7F (later 8F) 2-8-0 taper-boiler class.

**First of class withdrawn:** 9517/18/65, 9632/46 (1959)*
**Last of class withdrawn:** 49508 (1962)
**None preserved**
*all withdrawn same week

Nos. 9672-74, built at Crewe in 1932, were delivered new fitted with ACFI feed-water heaters for experimental purposes, and they ran in this form until about 1943-4. No. 9672 was photographed at Rugby; the Fowler tender had coal rails added to increase capacity.

*[T. G. Hepburn*



Right-hand side ¾ view of No. 9673 fitted with ACFI feed-water heater. In 1947 Nos. 9511/33, 9613/42/70 were converted to oil-burning and only 9511 reverted to coal; the others never ran again after oil-burning ceased in 1948.
*[British Rail LM Region*

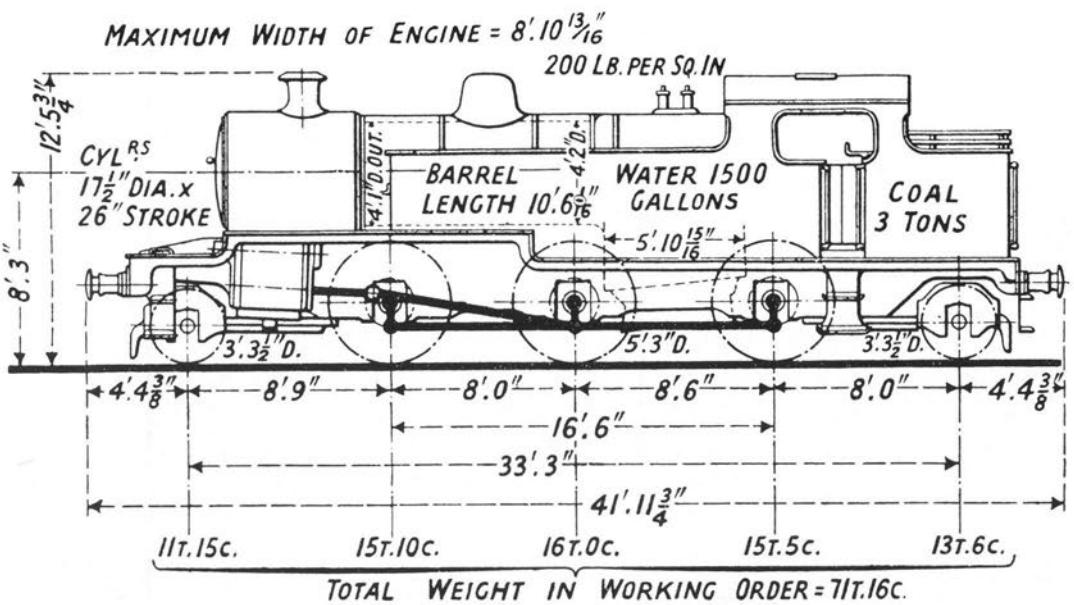
The appearance of the class 7F 0-8-0s remained practically unchanged throughout their undistinguished careers, and unlike many Fowler locomotives they retained their characteristic chimneys until the end. The class suffered massive withdrawals as early as 1949, when no less than 61 engines went to scrap-yards, and it must be regarded as the least successful of the Fowler classes; in fact being outlived by some of the ex LNWR G2 0-8-0s; the engines these were supposed to replace! No. 49509 was photographed in very characteristic role: trundling along on an unfitted freight. Coal rails had been added to the tender but otherwise no visible alterations had been made to the engine since building. *[Eric Treacy*

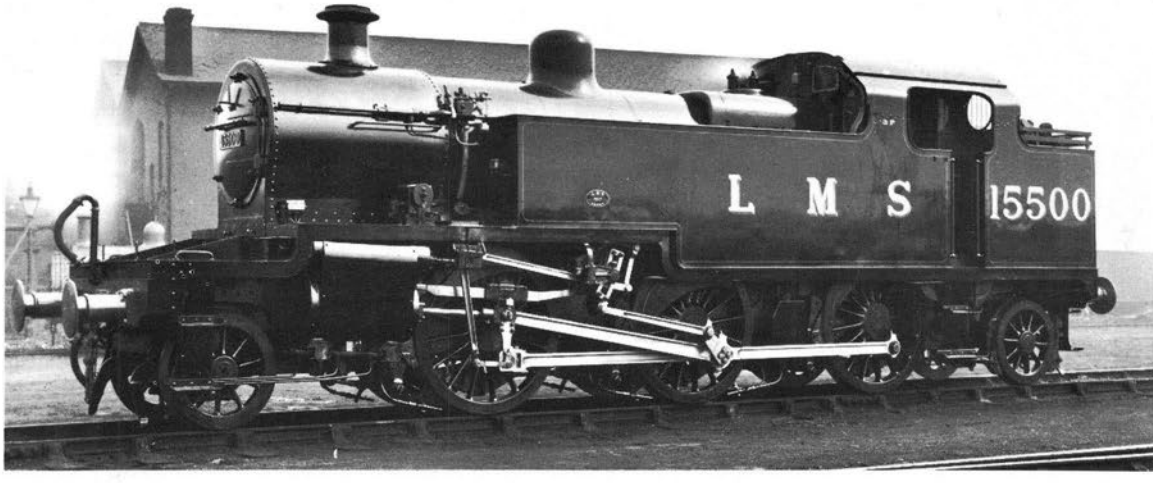
## Section: 14 2-6-2T Class 3P
## Passenger Tank Engines
Introduced: 1930 Total: 70

A Derby design proposal for an 0-6-2T passenger engine actually reached the stage of being ordered in April 1928. This would have had inside Walschaerts gear, with short travel, and a superheated type G6 boiler; but an estimated maximum axleload of 17¾ tons was too high for the wide route availability desirable for a new light passenger tank engine. The order was therefore cancelled before too much hard work had been done, and a fresh start was made with a 2-6-2T design, giving the desired wide route availability by means of a better distribution of the total weight.

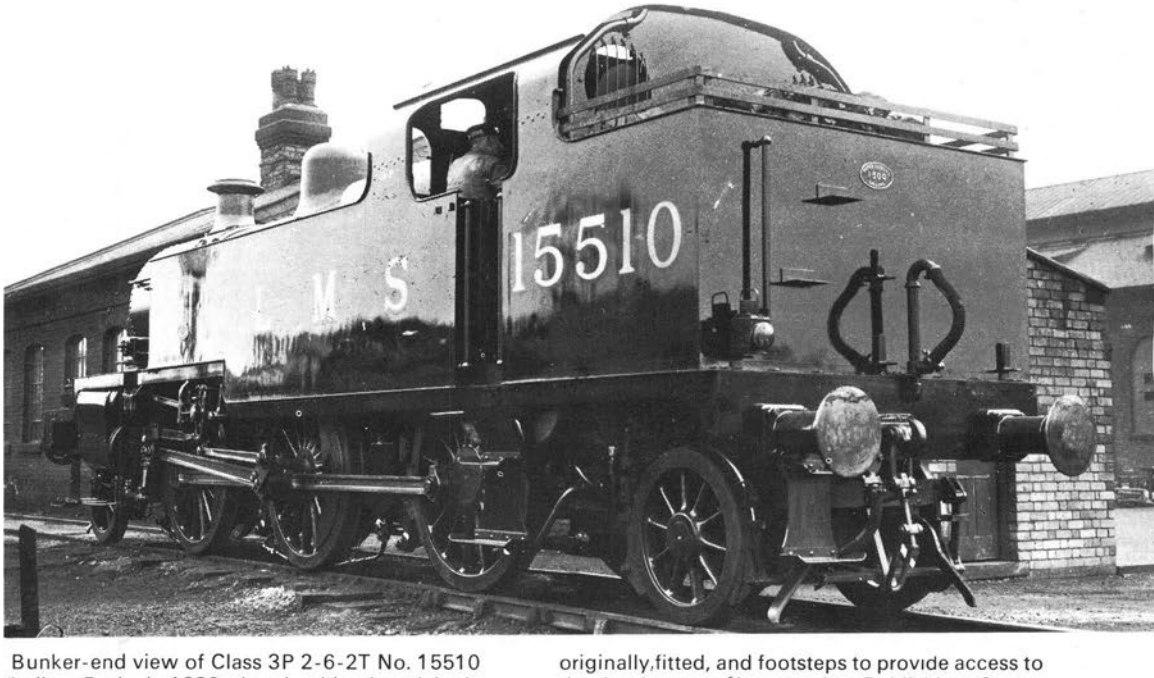
A G6S type parallel boiler was used for the new 2-6-2T, this being a superheated version of the Belpaire boiler used for reboilering the small former MR class 2 0-6-0s. The large and small tubes provided a heating surface of 692.7 sq ft and the firebox heating surface was 103.5 sq ft. The superheater heating surface was 172.7 sq ft. Boiler pressure was set at 200 lb per sq in.

The two outside cylinders were of 17½in diameter by 26in stroke, with piston valves and Walschaerts valve gear. The 5ft 3in diameter driving wheels were on the all-too-familiar Derby wheelbase spacing of 8ft plus 8ft 6in. Tractive effort at 85 per






First of the class, No. 15500, in new condition; finished in the LMSR black livery with red lining. Single bar crosshead and split brasses on leading crankpins; fluted side rods. The trailing bissel truck was fitted with brakes, but not the leading pony truck. *[British Rail LM Region*




Bunker-end view of Class 3P 2-6-2T No. 15510 built at Derby in 1930, showing bissel truck brakes originally fitted, and footsteps to provide access to the bunker. *[Locomotive Publishing Company*

cent boiler pressure was 21 486 lb. The weight in working order was 70 tons 10 cwt (increased to 71 tons 16 cwt on the engines fitted with condensing apparatus).

The engines were built as follows:

| | | |
|---|---|---|
| Nos 15500-15520 | Derby | 1930 |
| Nos 15521-15559 | Derby | 1931 |
| Nos 15560-15569 | Derby | 1932 |

(Nos 15520-15539 were condenser fitted.)

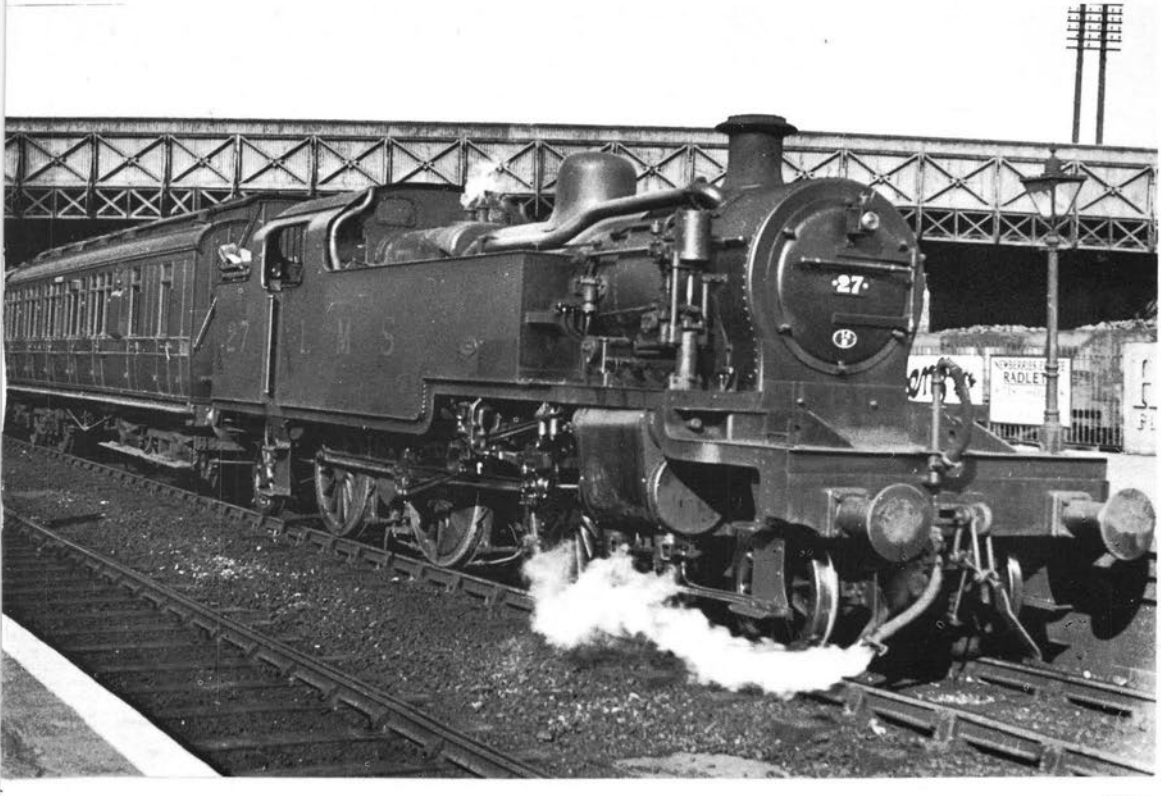
The class was renumbered by the LMSR in 1934, becoming Nos 1-70 and again by BR in 1948, becoming Nos 40001-40070.

Visually the class resembled a scaled-down version of the highly successful Fowler 2-6-4T design of 1927 (see page 89 ), but there the resemblance unhappily ended. They were poor performers because they were under-boilered and carried too much dead weight, and they had a feeble front end layout which no amount of subsequent modification seemed able to rectify. Sadly, even the Stainer taper-boiler development of the class, introduced in 1935, did not rectify these defects completely, as it retained the same general dimensions.

**First of class withdrawn:** 40005 (1959)
**Last of class withdrawn:** 40022 (1962)
**None preserved**

Nos. 15520-39 were fitted with condensing apparatus, and Weir steam-driven feed pumps and were allocated to the Midland Division London suburban trains working into Moorgate, replacing the Johnson 0-4-4Ts used previously. In 1934 the class was renumbered 1-70 inclusive, and No. 27, formerly No. 15526, was photographed at St. Albans in pre-war days with a London suburban working. Brakes removed from rear bissel truck. These engines had LT-style train stop/trip gear fitted.

*[T. G. Hepburn*

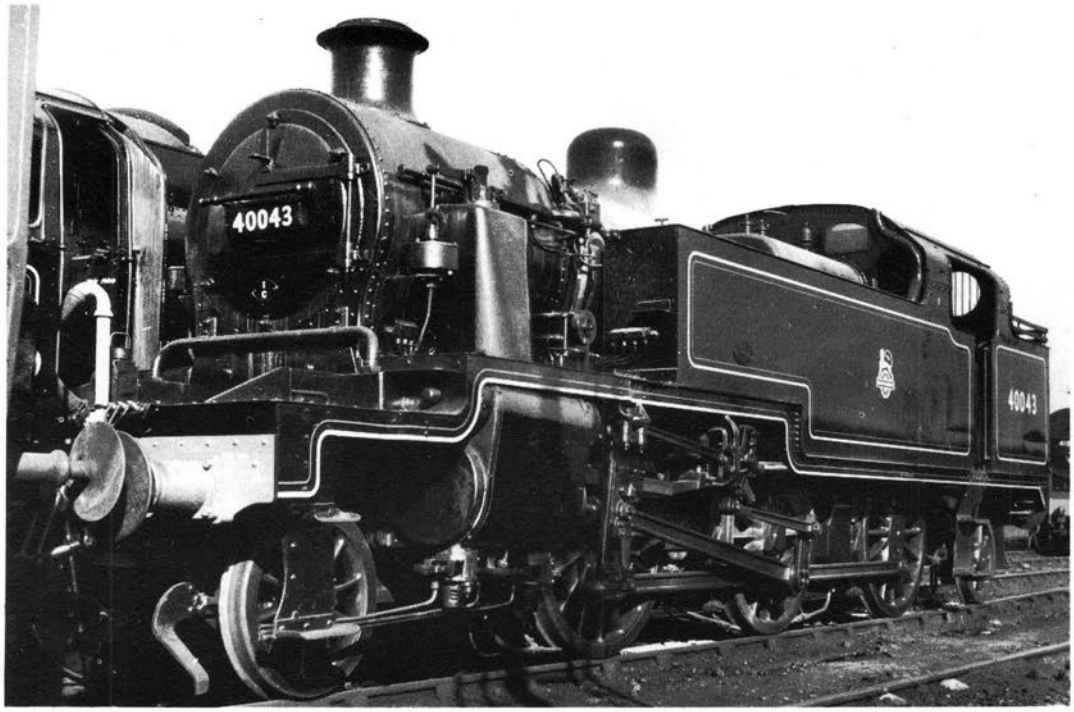


Condenser-fitted class 3P 2-6-2T No. 40033, photographed in early BR days at Farringdon with a train from Moorgate. A Metropolitan Line Uxbridge electric train is also in the picture. The engine has a Stanier chimney, and the steam-heating hose has been removed for renovation during the summer timetable. BR numerals, but the sidetanks retain the initials LMS.

*[P. Ransome-Wallis*

Some of the 3P 2-6-2Ts were equipped for auto-train working. No. 43 was photographed near Belmont on the Stanmore to Harrow auto-train, in July 1948. The engine had acquired a Stanier chimney. The cylinder for the vacuum controlled regulator valve can be seen on the right hand side of the smokebox. *[P. Ransome-Wallis*

A post-war attempt to improve the front-end layout of the Fowler 3P 2-6-2Ts, involving a larger blastpipe and chimney and provision of outside steampipes. Most of the class received these alterations, which did little or nothing to improve upon their mediocre performance ! Lettered 'British Railways' and carrying the temporary prefix M, on the bunker-sides, No. 49 was photographed at Winson Green in July 1948.
*[H. C. Casserley*

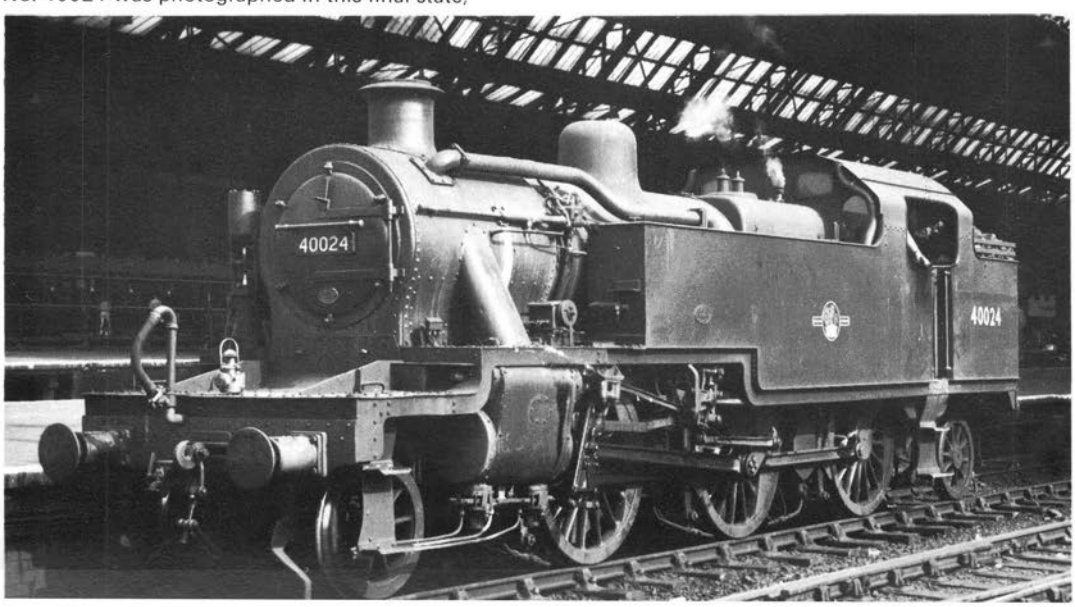



Push-pull fitted class 3P 2-6-2T No. 40043 photographed at Derby in August 1953. The front end had been improved, with large diameter chimney and outside pipes. The pipes were hidden by casings which incorporated the later form of vacuum controlled regulator valve. which was duplicated on either side of the smokebox.

*[R. J. Buckley*

The condensing engines were included in the post war front end modification programme, and No. 40024 was photographed in this final state, at St. Pancras in August 1959 ; in unlined black livery.

*[C. R. L. Coles*



The bold outlines of the large diameter Stanier-type chimney and the outside steam pipes are well emphasised in this striking photograph of class 3P 2-6-2T No. 40067, on local duties in Tebay NE yard in February 1953. *[J. E. Wilkinson*

## Section: 15 4-6-0 Class 5XP; later 6P Express Passenger Engines

Introduced: 1930 Total: 52

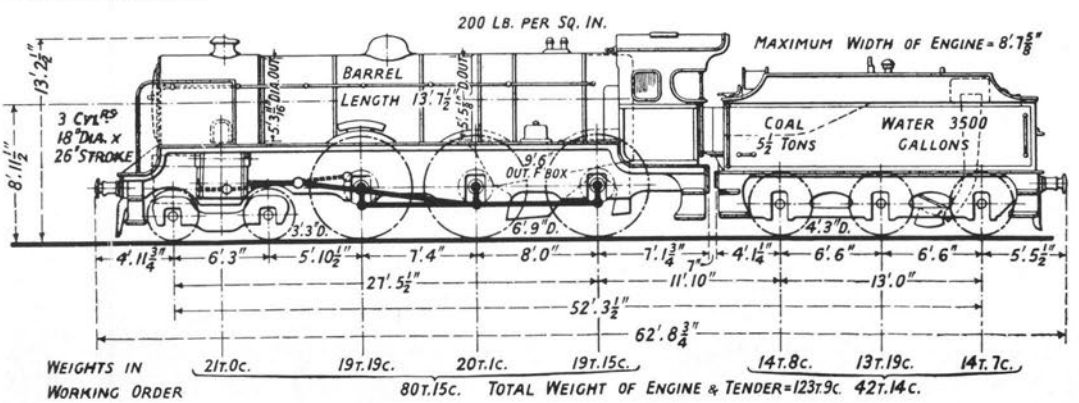
Patriot Class

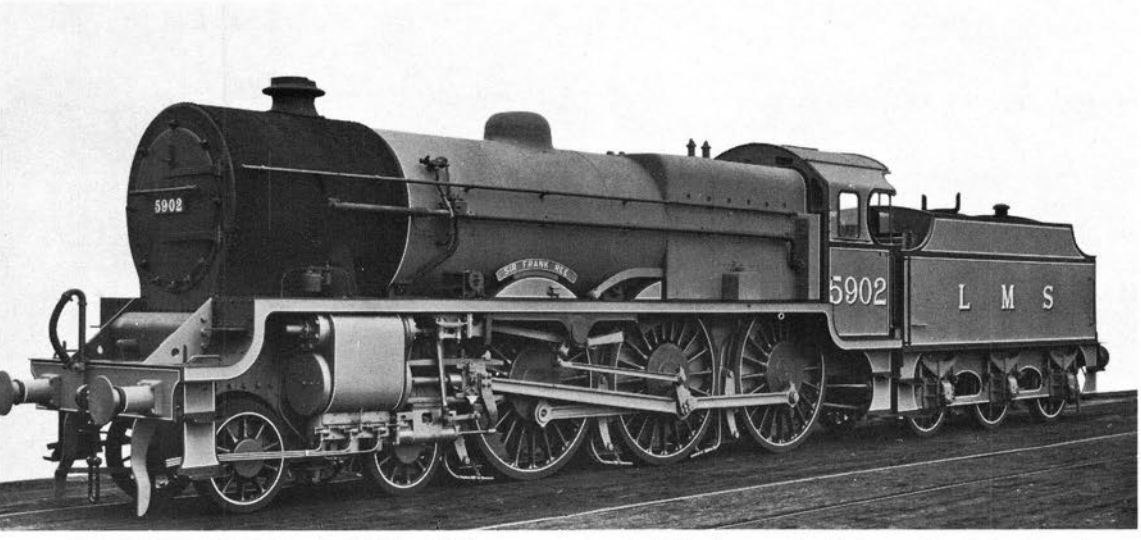
Since the Grouping, considerable efforts had been made to improve the ex LNWR Claughton class four-cylinder 4-6-0s, which represented the top-link express power inherited by the LMSR from the North Western main line. The Claughtons were capable of sustained fast running, but coal consumption and repair bills were heavy, and the overall performance of the engines in the class was very uneven. Experiments were made with Caprotti valve gear; with a Kylala blastpipe and narrow ring piston valves, and with an improved boiler design. Finally, a new larger boiler was designed, with 200 lb per sq in pressure instead of 175 lb. This was fitted to 20 Claughtons (10 with Caprotti valve gear) in 1928. Meanwhile the successful design and introduction of the Royal Scot class 4-6-0s (see page 77) had considerably eased the express passenger motive power situation on the former LNWR main line. There still existed a real need for a new express passenger engine of wider route availability than the 'Scots', for use elsewhere, however, and the rebuilt large-boilered Claughtons were an obvious candidate.

Despite the progressive modifications and improvements, the repair bills for the Claughtons remained unpleasantly high, which was discouraging to further efforts. Derby then hit upon the idea of mating the enlarged Claughton boiler with the three-cylinder chassis of the Royal Scot design; thereby producing a powerful 4-6-0 with a lower axle-loading, a sort of small edition Royal Scot.

Accordingly, two Claughtons were withdrawn from service (Nos 5902 and 5971) and theoretically rebuilt to the new design. The term rebuilt was rather wide of the mark, because all that actually remained of the

The drawing shows the locomotive after addition of smoke deflectors.



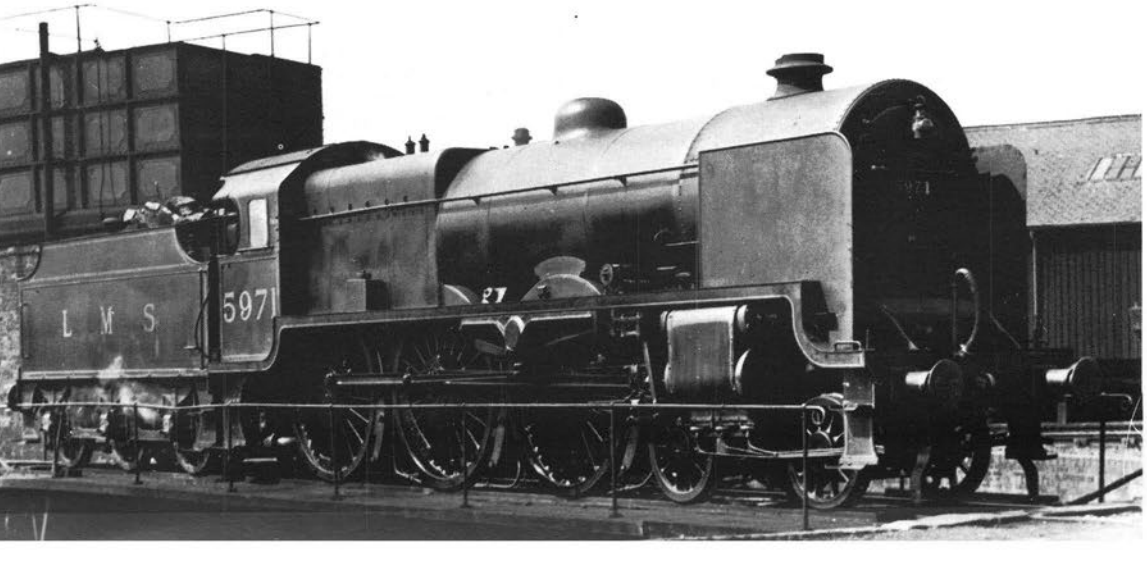



Rebuilt 'Claughton' class 4-6-0 No. 5902; classified 5XP and second of the two prototype rebuilds carried out at Derby in 1930. Some parts of the original 'Claughton' engine were retained, of which the large wheel centres and radial bogie can be most readily identified. The boiler was the same as applied to the large-boilered four-cylinder 'Claughton' 4-6-0 rebuilds, and the chassis was based upon the successful 'Royal Scot' class 4-6-0s. A new cab, similar to that of the 'Scots' was married to the standard Fowler tender with more harmonious results than was sometimes the case. No. 5902 was photographed in workshop grey livery, carrying the name *Sir Frank Ree,* off the former LNWR 'Claughton' The engine is in original condition, with fluted side rods and crosshead vacuum pump.

*[British Rail LM Region*

The other prototype 5XP, rebuilt from a former LNWR four-cylinder 'Claughton', was No. 5971, and was in fact the first to appear from Derby in 1930. In common with the 'Royal Scot' class 4-6-0s it was found desirable to equip the 5XPs with smoke deflectors in the early 1930s. No. 5971, at the time unnamed, was photographed in Nottingham Carriage Sidings with an early version of the side shields, later modified to be inclined towards the smokebox on the upper edge.

*[T. G. Hepburn*



Claughtons in the two new 5XPs were the driving wheel centres, the bogies and sundry small items including the whistle! On test the two locomotives proved to be superior to the four-cylinder enlarged Claughtons, and over an 8 year period the new 5XPs had repair costs which averaged out some 50 per cent lower. A further 40 'rebuilds' followed on (it being very doubtful if they actually had any Claughton parts at all) and then finally a batch of 10 was unrepentantly described by the LMSR as 'new engines'—which they were!

The parallel boiler, type G9½, had an evaporative heating surface of 1 735 sq ft, with the large and small tubes providing 1 442 sq ft, and the firebox 183 sq ft. The superheater gave 365 sq ft. The three 18in diameter by 26in stroke cylinders had piston valves driven by independent sets of Walschaerts valve motion, with the inside cylinder driving onto the leading coupled axle. At 85 per cent of the 200 lb per sq in boiler pressure, the tractive effort at the rims of the 6ft 9in driving wheels was 26 520 lb. The engine weight in working order was 80.75 tons (4½ tons less than a Royal Scot) and the standard Fowler tender weighed 42.7 tons, giving a total locomotive weight of 123.45 tons in working order.

The engines were delivered as follows: (1934 renumbering shown for ease of reference)

| Nos | | | 1934 Nos: |
|---|---|---|---|
| 5971, 5902 | Derby | 1930 | 5500-5501 |
| 5959/85/7 | Crewe | 1932 | 5502-5504 |
| 5949/74 | Crewe | 1932 | 5505-5506 |
| 5936, 6010 | Crewe | 1932 | 5507-5508 |
| 6005/12 | Crewe | 1932 | 5509-5510 |
| 5942/66 | Crewe | 1932 | 5511-5512 |
| 5958/83/92 | Crewe | 1932 | 5513-5515 |
| 5982 | Crewe | 1932 | 5516 |
| 5952, 6006/8 | Crewe | 1933 | 5517-5519 |
| 5954, 5933/73 | Derby | 1933 | 5520-5522 |
| 6026, 5907 | Crewe | 1933 | 5523-5524 |
| 5916/63 | Derby | 1933 | 5525-5526 |
| 5944/96 | Derby | 1933 | 5527-5528 |
| 5926, 6022/7 | Crewe | 1933 | 5529-5531 |
| 6011 | Crewe | 1933 | 5532 |
| 5905/35/97 | Derby | 1933 | 5533-5535 |
| 6018, 6015, 6000 | Crewe | 1933 | 5536-5538 |
| 5925, 5901/3 | Crewe | 1933 | 5539-5541 |
| 5542-5551 | Crewe | 1934 | 5542-5551 |

40000 was added to the numbers by BR in 1948.

The enthusiasts of the day were quick to nickname the new class 'Baby Scots', a description which did not win official

Stanier agreed, in 1932, to the completion of a further 50 class 5XPs, as a considerable amount of material had been ordered by the time he took command of LMSR locomotive affairs. Nos. 5502-5511 retained the radial bogie from the former 'Claughton' class engines of which they were (for accountancy reasons) rebuilds, although little, if anything, else was retained. Nos. 5512-41 were also classed as rebuilds, but the final series, Nos. 5542-51 completed at Crewe in 1934 were entirely new engines. Stanier introduced his improved bogie design (No. 5512 onwards), improved axleboxes, wheels and tyres, but the general design, including the Derby parallel boiler, remained unaltered. The Stanier batches had plain side rods, and in some cases coal rails were added to increase tender capacity. No. 5526, in immaculate condition, makes a pleasing picture on the down 4.35 pm Euston to Birmingham express, at Hatch End in 1935. *[F. R. Hebron*

From 1936 to mid-1938, class 5XP 4-6-0 No. 5535 ran with an experimental top feed ahead of the steam dome, on one side only. The locomotive was photographed at Nottingham Midland, carrying this rather ungainly fitting. The numbering of the 5XPs was altered to Nos. 5500 onwards in 1934, with the final batch receiving the new numbering as built new at Crewe; although ordered as No. 6030 onwards. The first 42 engines originally carried the numbers of the 'Claughtons' that they were supposedly rebuilt from. *[T. G. Hepburn*

approval. In due course an enthusiast suggested that the name *Patriot,* from the former LNWR Claughton class locomotive No 1914 (which was the LNWR War Memorial engine) due for scrapping, should be transferred to a modern locomotive. This idea was accepted by the LMSR authorities, who bestowed the name upon the prototype 5XP. Henceforth the class became officially described as the Patriot class.

The 5XPs were fast engines, capable of equalling a Royal Scot for speed, and they were favourite motive power for fast freight work as well as medium range express passenger services.

W. A. Stanier took over as CME of the railway just as the bulk of the 5XP class were on order. So much material was already to hand that he allowed construction to continue, but he insisted upon a number of modifications being made as building progressed, in particular to the design of the bogies and axleboxes. His own 5XP taper-boiler Jubilee class 4-6-0 design of 1934 was closely developed from the Patriots.

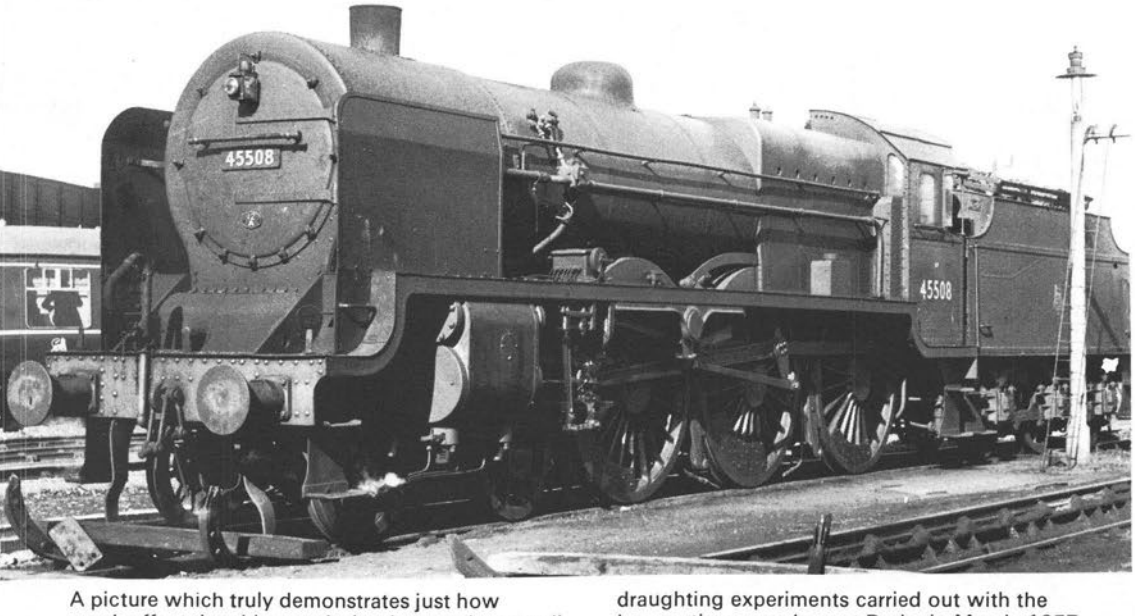
A further development affected the Patriot class from 1946 onwards, when H. G. Ivatt commenced rebuilding them with type 2A Stanier taper-boilers, new smokebox and double chimney, new cab and new Stanier tenders. Only 18 were dealt with before the development of alternative new BR standard steam locomotive designs brought a halt to the programme. This final rebuilding forms the subject of section 14, page 112, of *Stanier Locomotives.* The locomotives were rebuilt as follows: Nos 5521/30 (1946); Nos 5514/26/8/9/31/40 (1947); Nos 45512/23/5/7/32/4-6/45 (1948); No. 45522 (1949). The remainder ran unaltered until final withdrawal; being the first to go.

**First of class withdrawn:** 45502 (1960)
**Last of class withdrawn:** 45530 (1965)
**None preserved**

Two 'Patriots' battle with the incline to Shap, past Scout Green box, with a Liverpool to Glasgow express. The locomotives were Nos. 45511 *Isle of Man* and 45524 *Blackpool*. The power classification 5XP was altered to 6P in BR days; the 6P 'Royal Scots' becoming '7P'. *[F. R. Hebron*

A truly remarkable photograph, taken at Byfleet on the SR main line, on February 16, 1950. The train is composed of former LNER Teak stock (only one is in BR red and cream livery) and the occasion is the through working of an up special boat train from Southampton Docks; carrying homeward-bound troops of the 1st Battn. The Bedfordshire and Hertfordshire Regiment after 25 years service abroad. The locomotive is 5XP 4-6-0 No. 45516 *The Bedfordshire and Hertfordshire Regiment,* specially sent to the SR for the working. Although renumbered 45516 in the BR scheme, the engine is incredibly still in her pre-war Crimson Lake livery—and very beautiful she looks, with a polish on the paintwork fit for royalty!

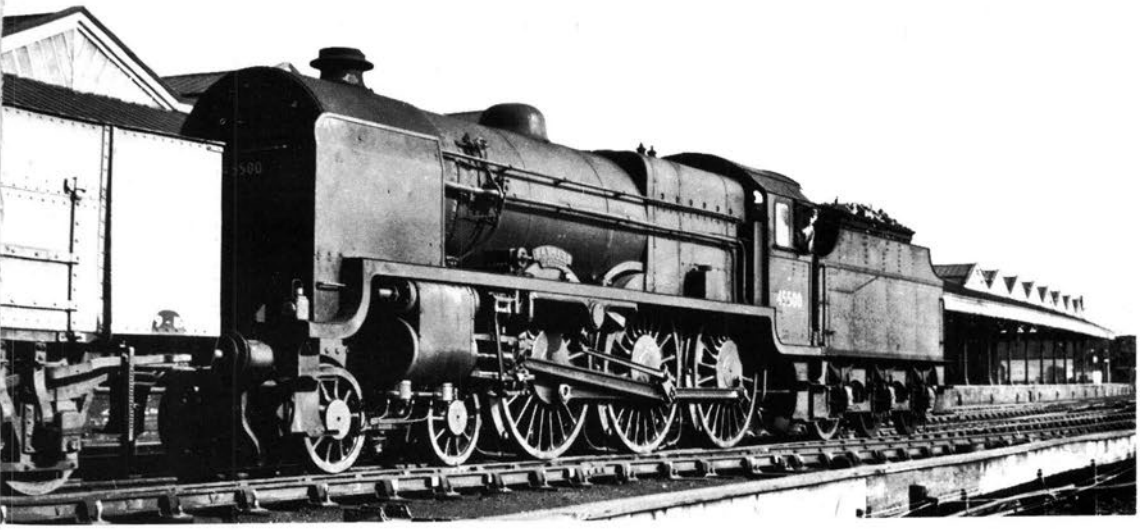
*[British Rail SR*




A picture which truly demonstrates just how much effect the chimney design has on the overall appearance of a steam locomotive. This hideous appendage to No. 45508 was a sad side effect of draughting experiments carried out with the locomotive; seen here at Derby in March, 1957.

*[R. J. Buckley*

In clean BR lined-green livery, No. 45537 *Private E. Sykes V.C.* heads a light load, photographed near Clifton in 1950. No. 45537 was not one of the class rebuilt by H. G. Ivatt from 1946 onwards to Stanier's specification (with the same 2A taper boiler used on the converted 'Royal Scots'). Only 18 of the class were in fact rebuilt and the first 12, Nos. 45500-11, were, in any case, excluded from the programme due to their non-standard bogies and other fittings. Rebuilding ceased in 1949, with No. 45522, and the remaining parallel-boiler locomotives ran the rest of their lives without significant alteration, even retaining their distinctive Fowler chimneys. *[E. D. Bruton*



*Patriot* herself, in final days as BR No. 45500 and caught by the camera on humble shunting duties at Stafford. Both this engine and No. 45501 (originally Nos. 5971 and 5902 respectively) retained their original LNWR 'Claughton' type large diameter coupled wheel centres, until withdrawal from service. The tender had been fitted with coal rails, but otherwise the appearance of the engine was little altered, since the addition of smoke deflectors and the removal of the crosshead vacuum pump during the 1930s. *[J. B. Bucknall*

Patriot' 4-6-0 No. 45539 *E. C. Trench* photographed arriving at Manchester London Road with an express from the West of England, composed of WR stock. The locomotive is paired with one of the 10 Fowler high-sided tenders, originally fitted to 5XP 'Jubilee' class 4-6-0s Nos. 5607-5616, (see also page 20). *[K. Field*

# Appendix
# Named Locomotives

Showing all named Fowler locomotives, with their LMSR numbers. All the locomotives with the exception of No. 6399, received BR numbering in 1948, when 40000 was added to their existing numbers. Power classifications were also altered in BR days, the 5XP 4-6-0s became 6P and the 6P 4-6-0s became 7P. The locomotives later rebuilt to Stainer's designs are denoted by an asterisk*; in some cases the rebuilding took place after nationalisation. Locomotives which received their name, or a change of name, after entering service have the year added in brackets. Many locomotives had their nameplates removed, either by vandals or for safe keeping, in the final years of service.

2-6-4T Class 4P Passenger Tank Engine (see page 89 )

2313 The Prince
(The name was handpainted onto tank-sides; removed in 1933)

4-6-0 Class 5XP and 6P* (rebuilt) Patriot (see page 118)

5500 Croxteth: Patriot (1937)
5501 Sir Frank Ree: St. Dunstans (1937)
5502 Royal Naval Division (1937)
5503 The Leicestershire Regiment (1938): The Royal Leicestershire Regiment (1948)
5504 Royal Signals (1937)
5505 The Royal Army Ordnance Corps (1947)
5506 The Royal Pioneer Corps (1948)
5507 Royal Tank Corps (1937)
5509 Derbyshire Yeomanry (1951)
5511 Isle of Man (1937)
*5512 Bunsen
*5514 Holyhead (1938)
5515 Caernarvon (1939)
5516 The Bedfordshire and Hertfordshire Regiment (1938)
5518 Bradshaw (1939)
5519 Lady Godiva
5520 Llandudno (1937)
*5521 Rhyl (1937)
*5522 Prestatyn (1939)
*5523 Bangor (1938)
5524 Sir Frederick Harrison: Blackpool (1937)
*5525 E. Tootal Broadhurst: Colwyn Bay (1937)
*5526 Morecambe and Heysham (1937)
*5527 Southport (1937)
*5528 REME (1960)
*5529 Sir Herbert Walker K.C.B. (name removed 1937): Stephenson (1949)
*5530 Sir Frank Ree (1937)
*5531 Sir Frederick Harrison (1937)
*5532 Illustrious
5533 Lord Rathmore
*5534 E. Tootal Broadhurst (1937)
*5535 Sir Herbert Walker K.C.B. (1937)
*5536 Private W. Wood V.C. (1935)
5537 Private E. Sykes V.C.
5538 Giggleswick (1938)
5539 E. C. Trench
*5540 Sir Robert Turnbull
5541 Duke of Sutherland
5543 Home Guard (1940)
*5545 Planet (1948)
5546 Fleetwood (1938)
5548 Lytham St. Annes (1937)

Names were selected for several Patriots in 1943, but never actually carried, as follows:

5505 Wemyss Bay

5509 Commando
5513 Sir W. A. Stanier
5542 Dunoon
5549 R.A.M.C.
5550 Sir Henry Fowler
5551 Rothesay

A further set of names was selected for rebuilt engines, but not used, as follows: Vulcan, Goliath, Courier, Velocipede, Champion, Dragon, Harlequin.

4-6-0 Class 6P (3-cyl)
Royal Scot (see page 77 )

*6100 Royal Scot
*6101 Royal Scots Grey (1928)
*6102 Black Watch (1928)
*6103 Royal Scots Fusilier (1928)
*6104 Scottish Borderer (1928)
*6105 Cameron Highlander (1928)
*6106 Gordon Highlander (1928)
*6107 Argyll and Sutherland Highlander (1928)
*6108 Seaforth Highlander (1928)
*6109 Royal Engineer (1928)
*6110 Grenadier Guardsman (1928)
*6111 Royal Fusilier (1928)
*6112 Sherwood Forester (1928)
*6113 Cameronian (1928)
*6114 Coldstream Guardsman (1928)
*6115 Scots Guardsman (1928)
*6116 Irish Guardsman (1928)
*6117 Welsh Guardsman (1928)
*6118 Royal Welch Fusilier (1928)
*6119 Lancashire Fusilier (1928)
*6120 Royal Inniskilling Fusilier (1928)
*6121 H.L.I. (1928): Highland Light Infantry, City of Glasgow Regiment (1949)
*6122 Royal Ulster Rifleman (1928)
*6123 Royal Irish Fusilier (1928)
*6124 London Scottish (1928) (a)
*6125 Lancashire Witch (1928) (a): 3rd Caribinier (1935)
*6126 Sanspareil (1928): Royal Army Service Corps (1935)
*6127 Novelty (1938): The Old Contemptibles (1936)
*6128 Meteor (1928): The Lovat Scouts (1936)
*6129 Comet (1928): The Scottish Horse (1935)
*6130 Liverpool (1928): The West Yorkshire Regiment (1935)
*6131 Planet (1928): The Royal Warwickshire Regiment (1936)
*6132 Phoenix (1928): The King's Regiment (Liverpool) (1936)
*6133 Vulcan (1928): The Green Howards (1936)
*6134 Atlas (1928): The Cheshire Regiment (1936)
*6135 Samson (1928): The East Lancashire Regiment (1936)
*6136 Goliath (1928): The Border Regiment (1936)
*6137 Vesta (1928): The Prince of Wales's Volunteers South Lancashire (1936)
*6138 Fury (1928): The London Irish Rifleman (1929)
*6139 Ajax (1928): The Welch Regiment (1936)
*6140 Hector (1928): The King's Royal Rifle Corps (1936)
*6141 Caledonian (1928): The North Staffordshire Regiment (1936)
*6142 Lion (1928): The York & Lancaster Regiment (1936)
*6143 Mail (1928): The South Staffordshire Regiment (1934)
*6144 Ostrich (1928): Honourable Artillery Company (1932)
*6145 Condor (1928): The Duke of Wellington's Regt. (West Riding) (1935)
*6146 Jenny Lind (1928): The Rifle Brigade (1936)
*6147 Courier (1928): The Northamptonshire Regiment (1935)
*6148 Velocipede (1928): The Manchester Regiment (1935)
*6149 Lady of the Lake (1928): The Middlesex Regiment (1936)
*6150 The Life Guardsman
*6151 The Royal Horse Guardsman
*6152 The King's Dragoon Guardsman
*6153 The Royal Dragoon
*6154 The Hussar
*6155 The Lancer
*6156 The South Wales Borderer
*6157 The Royal Artilleryman
*6158 The Loyal Regiment (1931)
*6159 The Royal Air Force (1931)
*6160 Queen Victoria's Rifleman (1931)
*6161 The King's Own: King's Own (1931)

*6162 Queen's Westminster Rifleman (1932)
*6163 Civil Service Rifleman (1932)
*6164 The Artists Rifleman (1932)
*6165 The Ranger (12th London Regiment) (1932)
*6166 London Rifle Brigade (1932)
*6167 The Hertfordshire Regiment (1932)
*6168 The Girl Guide
*6169 The Boy Scout

(a) These two locomotives were shown in published lists as
6124 Lancashire Witch;
6125 Perseverance

The originally proposed names for Nos 6101-49 were:—
Highland Chief; Royal Scots Grey; Black Watch; Lothian; Royal Scots Fusilier; Scottish Borderer; Cameron; Gordon; Argyll; Sutherland; Seaforth; London Scottish; Lovat's Scouts; Guardsman; Royal Engineer; Grenadier; Royal Fusilier; Sherwood Forester; Royal Welch; Coldstream; Lancashire Witch; Perseverance; Sanspareil; Novelty; Meteor; Comet; Liverpool; Planet; Phoenix; Vulcan; Atlas; Liver; Samson; Goliath; Vesta; Fury; Ajax; Hector; Caledonian; Mail; Bee; Ostrich; Condor; Jenny Lind; Courier; Velocipede; Lady of the Lake; Jeannie Deans; Ionic.

4-6-0 EXPERIMENTAL DESIGN
(see page 103)
6399 Fury
(Rebuilt by Stanier in 1935 as taper-boiler class 6P 4-6-0; renumbered 6170 in the Royal Scot series, and renamed British Legion).
In addition to the above list of names, mention should be made of Class 3F 0-6-0T No. 7659, which was WD No. 12 and SNCF No. 030TW026 and carried the name Corsair whilst in France, 1940-1948.

# Bibliography

Reference was made to the following works whilst compiling this volume:

Locomotive Panorama. Vol. 1 (E. S. Cox).
The Fowler and Stanier Locomotives of the LMS. (C. Langley Aldrich).
The Midland Compounds. (D. F. Tee).
London Midland & Scottish. (C. Hamilton Ellis).
A Modern Locomotive History. (paper by E. S. Cox).
Locomotive Liveries of the LMS. (D. Jenkinson).
Royal Scots of the LMS. (Edited by Douglas Doherty).
Loco-Profile No. 8 Royal Scots. (Brian Reed).
Jubilees of the LMS. (John F. Clay).
The Somerset and Dorset 2-8-0s. (David Milton).
Certain facts are quoted from the minutes of the Loco and Mechanical Engineering Committees of the LMS; obtained from BRB archives by P. Rowledge.
The later history of the Fowler Patriot and Royal Scot class 4-6-0s is dealt with in the companion volume:
Stanier Locomotives. A pictorial history (Brian Haresnape) Ian Allan Ltd. 1970.

ISBN 1-901945-00-6

9 781901 945003